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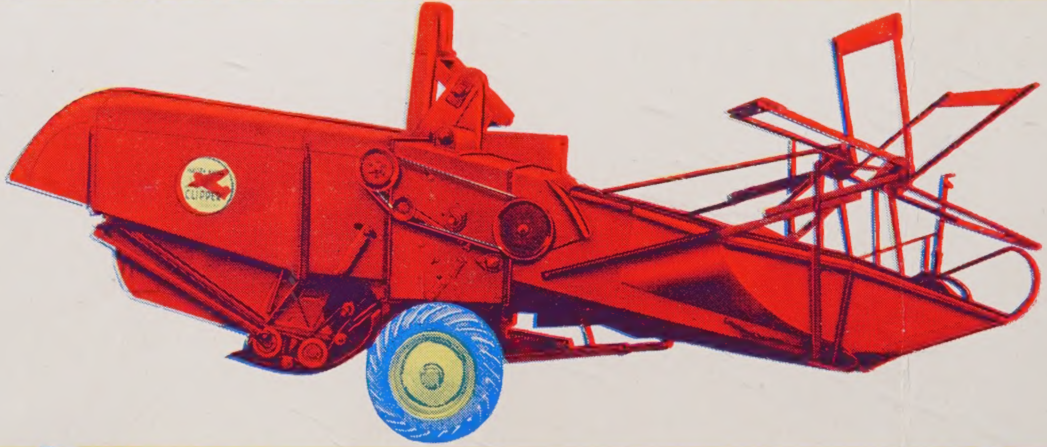

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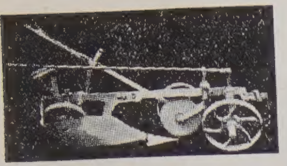

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Agriculture.

Standards and the Farmer

By
W. G. WHITTLESTON,
Physical Chemist, Animal Research Station, Ruakura.

NO principle has been more widely misunderstood than the principle of standardisation. Often a standard specification is treated as if it were some unnecessary piece of "red tape" serving no other purpose than to annoy the layman. Nothing could possibly be further from the truth. The layman has everything to gain from standardisation: it is his best guarantee against being taken in by an unscrupulous vendor. Standardisation is therefore of equal advantage to the scrupulous vendor. It is the object of this article to try to explain the principles behind standardisation and to show how standards would work in practical problems on the dairy farm.

THERE are two kinds of standards in general. War emergency standards differ from normal standards. The former are brought in during wartime as a means of urgent economy, which will make sure that some vital material will be used with the utmost economy, or equipment will be made with an absolute minimum of labour, having due regard to efficiency and utility. Sometimes such standards may be restrictive, but at least they ensure that the articles in question will be available. The emergency standard milking rubberware is a case in point. It is better to milk with emergency standard inflations than to try to milk 50 cows by hand without help. The second kind of standards are those with which we are concerned in the present article; that is, normal standards which operate in peacetime as well as in war.

Dairy Production Standards

A standard may be described as a summary of the best knowledge available on how to make an article, and the progress of an industry may be gauged by the degree to which it uses standards. An excellent example of a progressive industry which works to high standards is our own dairy industry on the production side. All our butter and cheese as it passes the grading ports is required to meet very high standards for quality. The crates and boxes in which it is packed are all required to reach a standard. Milk and cream are checked as they enter our factories and pay-out depends on the extent to which the raw material from the dairy farms conforms with standards of quality. In other words, the dairy farmer is compelled to sell to a standard; therefore, it is only just that the goods he buys and the equipment he needs for the production of milk and cream should conform to standards of quality.

If a farmer were paid for his milk in counterfeit coins, he would rightly be indignant. The impress of our King's head on our coins is a standard mark—a guarantee of their value. And the farmer exchanges his money for articles of whose quality he cannot be sure. When he buys a set of teat-cups for his milking machine he has no guarantee that they will last more than one season; when he buys a relief valve he has no guarantee that it will work properly.

Testing a New Idea

The commonest retort to such arguments is that admittedly the buyer takes a risk, but he will learn ultimately who are the reliable manufacturers, and anyway standards will hold up progress. It is said if you standardise an article you will stop new ideas from being applied. As a matter of fact this argument is so far from the truth as to be almost laughable. It is in those industries which use standards as a normal thing that progress is made most rapidly.

If your product conforms to a specification which includes the best knowledge available at any time, you know immediately the value of a new idea. Further, through the standards committee it is possible for a new idea to be discussed and examined by representatives of all parties interested—the manufacturers, the retailers, the consumers, and the Government Departments concerned. Thus it is possible for a new idea to come before representatives of everyone likely to be interested. It can be tested out with all the facilities of the Government Departments and manufacturers' workshops, and it can be modified to suit the consumers' needs in the best possible way.

Committee Considers Invention

Let us examine the procedure with an imaginary committee set up to deal with standards for milking machine parts. An inventor sends in details of a new relief valve he has developed. A description is sent to all of the members of our imaginary committee; representatives of the manufacturers of milking machine parts, milking machine companies, farmers' union, and Government Departments concerned, e.g., the Dairy Division and Animal Research Division, Department of Agriculture. Then at a conference the idea is discussed.

Now we imagine that a standard for relief valves has been drawn up and it involves good performance and wearing qualities. The new valve is tested. It proves to be better than the existing standard, but it is somewhat flimsy. The farmers' representative points out that it would not stand up in an average shed. The manufacturers suggest an improvement which will solve that problem. The thread on it is the wrong size: it would not fit many machines. This is altered to the standard size. The milking machine companies' representative points out a method of making the valve more nearly fool-proof.

Ultimately the standard specification for relief valves is redrafted to include the improvements, and the new invention is made available as soon as stocks permit in a form which is suitable to everybody concerned. Thus standards are always on the move; always making the article concerned better and better. Standards are never static. Does this procedure hold up progress? Where at present can an inventor have his ideas discussed with everybody concerned? How many valuable inventions are not in use because they need only slight modifications to make them practicable?

What Standards Ensure

The general use of standards ensures that the buyer of goods bearing the standard mark is always sure he is getting the best in quality and performance. That is why in industries which have made such startling progress during the last decade, such as the telephone and radio industries, standards are the normal thing.

The spokesman for one of the world's greatest telephone companies said recently: "I think our attitude towards standards might be expressed by saying that to-day's standards are to-day's statements of the most we know about the things we employ. To-morrow's standards may or may not be the same. One thing we do when discarding an old friend is to be sure that the new one will serve us better, and, as far as possible, have a definite bridge between the old and the new."

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would fit your particular light socket or one kind of spark plug would fit your car. And yet farmers still tolerate this sort of thing in their equipment.

A standard specification covers two main aspects of a product: it sets a minimum level of quality and it ensures that certain dimensions are uniform.

Milking Machine Parts

Let us examine the way in which standards would influence the milking machine as an example.

Vacuum Pumps. Present-day rotary vacuum pumps are almost standardised. There are one or two points which might be checked. A standard pump would be required to displace so much air under specified conditions and not consume more than a certain amount of power. It would be required to be capable of certain endurance tests, after which its efficiency should not have decreased by a significant amount. All manufacturers would be expected to conform to the highest possible performance tests.

Vacuum Tanks. The limits of size with respect to different sized plants would be specified, together with constructional details, ensuring ease of dissembling, type of threads on connecting joints, size of draining flap, etc. The quality would be controlled by setting out the thickness of metal used and thickness of tinning.

Releasers. Capacity, threads, and flaps would be specified, so that any releaser would fit any machine and all flaps would be interchangeable—though a selection of types of flap could be permitted, if desired. The specification would make sure that when a releaser was bought for a plant of a given size if it bore the standard mark it would work perfectly.

Pulsators. Again dimensions which would ensure the best performance and minimum power consumption would be specified. Stroke would be standardised, so that any pulsator valve would, with a minimum of adjustment, fit any machine.

Relief Valves. At present there is a considerable assortment of threads and sizes of relief valves. There are types being sold which are of little use. A standard relief valve could be of any type **so long as it reached a required degree of performance.** It would have a thread agreed on by all interested parties, which would ensure that it would fit any machine.

Teat-cups. At present there is an assortment of types of teat-cups on the market which vary in an astonishing degree with respect to dimensions, thickness of material used, strength of metal, and methods of assembly. Some can be described only as shoddy; others are excellent. Some fit the inflations well, protect the rubber tops, and do not go out of shape when knocked about. Others give continuous trouble due to one cause or another, trouble for which the farmer cannot fairly be blamed. There should be only one quality of teat-cup—or of anything else—the best. Dimensions should be such that they will fit the cows' teats: peculiar sizes should not be permitted when the only object is to make the farmer go back to one particular firm for replacements, such as rings or nipples. And when he buys rings and nipples, regardless of the make of cup he uses, the farmer should know they will fit.

The Economic Aspect

The above details give some idea of the way standards work. No mention has been made of the savings in production and therefore lower costs made possible by their use. In some American industries the recent introduction of standards brought costs down 25 to 50 per cent. and more, and at the same time quality went up.

At the present time our job is to get the most butter and cheese per cow per acre and per man on the land. But the farmer has to live. He gets no overtime for working long hours. However, if his costs go down, his income goes up, and standardisation is a way of keeping costs down. Firstly, standards will help to reduce the production costs of the goods he buys; secondly, he will get the best value for his money.

There is a lot of talk about inflation at present. Most people think it just means rising prices and more money in the people's pockets. Even if prices remain fixed, if quality goes down, and you therefore have to buy more, there is a very insidious type of inflation in progress. Fixed prices mean nothing unless quality is set by standards. This is another way in which standardisation will help to keep the farmer's real income up.

Buyer Can Act

One aspect of the work of the Standards Institute which has been referred to should be emphasised. Through the medium of committees set up through the facilities offered by the institute it is possible for the farmer to be represented and to take an active part in drawing up the specifications of the goods he buys. If he feels that someone has "put one across" him in selling him a "gadget" which does not work, he can take this up through his union or any other organisation to which he belongs and a standard can be prepared which will protect him and his fellows against exploitation by sharp-witted salesmen. For instance, if a new type of pulsator, for which certain claims are made, is offered for sale, and in practice these claims are not fulfilled, it would be illegal for the vendor to use the standard mark on the product.

Of course, if the farmer wants to be taken down by people selling non-standard goods, he is free to be so treated. There is no compulsion about standardisation. It simply means that goods marked standard comply with the specifications drawn up by the committee. Goods not marked standard may be of any quality. The sensible farmer, like the sensible engineer, would buy standard goods.

The man who buys non-standard goods for which there is a standard has no reason to complain if he is taken in. But if he buys goods marked standard and they are not up to the specifications, he has a right to take action against the maker.

Advantages, Possibilities

Briefly, the advantages of employing standards are:—

To the manufacturer: He has to make fewer types, which means longer runs without changes, less capital tied up in stocks, and faster turnover.

To the retailer: He has a quicker turnover, smaller stocks, and, if he is doing repair work as well, easier replacements.

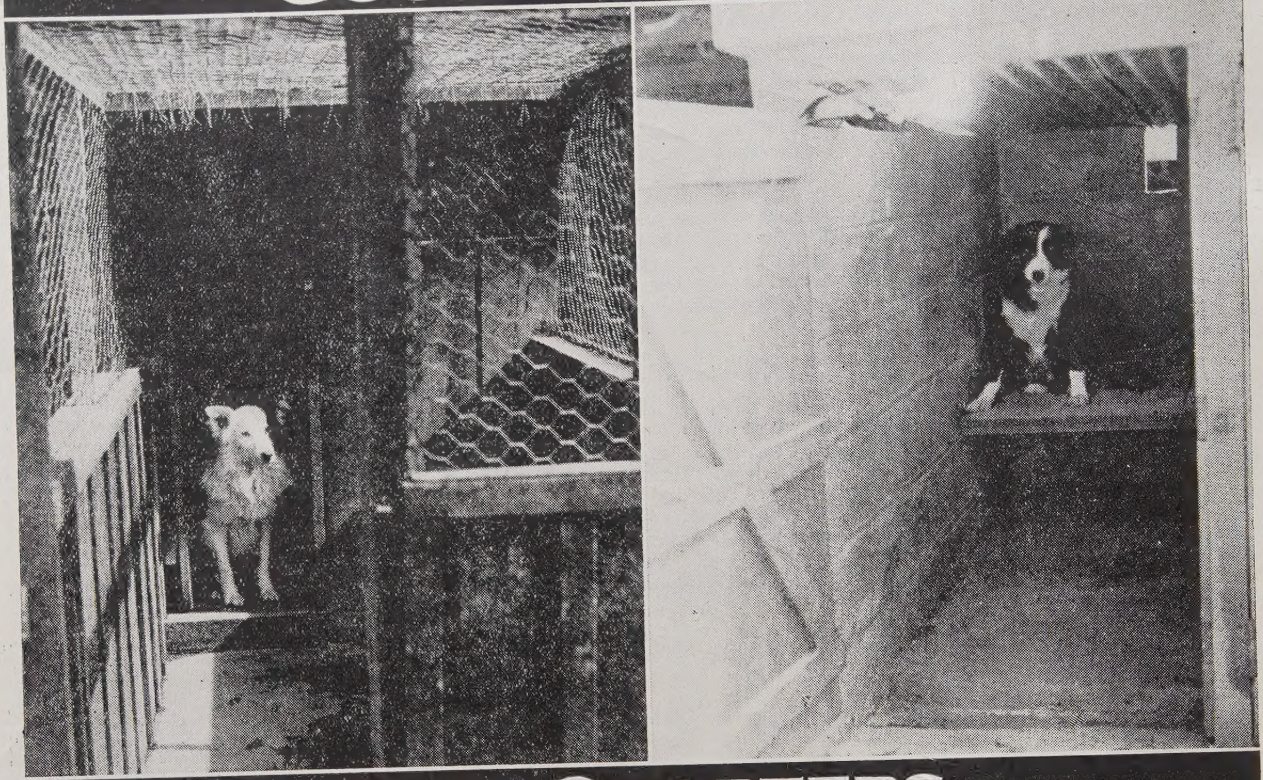
To the consumer: He gets the best value for his money and he knows what he is getting; he can order more accurately by simply quoting a specification number.

The organisation of the Standards Institute makes possible:—

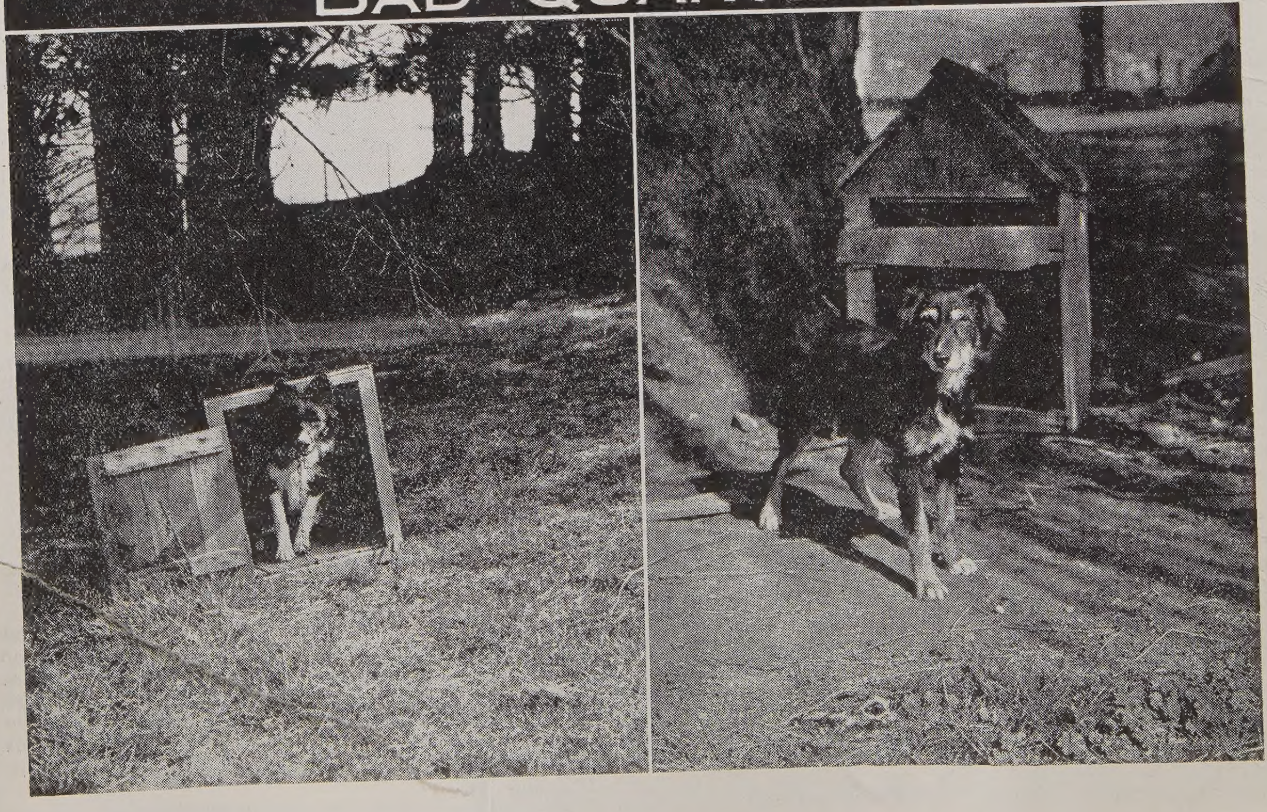
1. The consultation of all interested parties in the production of an article.
2. The chance to have the best experts and facilities from Government laboratories at the disposal of the people concerned.
3. The chance for an inventor to bring his ideas before those likely to be interested and to have his inventions tested fairly by the most capable people.
4. The possibility that a new idea can become quickly available to the consumer without costly experimentation at the consumer's expense, as happens often at present.

It should be pointed out again that the farmer has to sell his goods to high standards of quality, and it is up to him to demand that he **buys** his requirements to high standards of quality. If the farmer wants standards the machinery for drawing them up is ready to be put into action.

GOOD QUARTERS

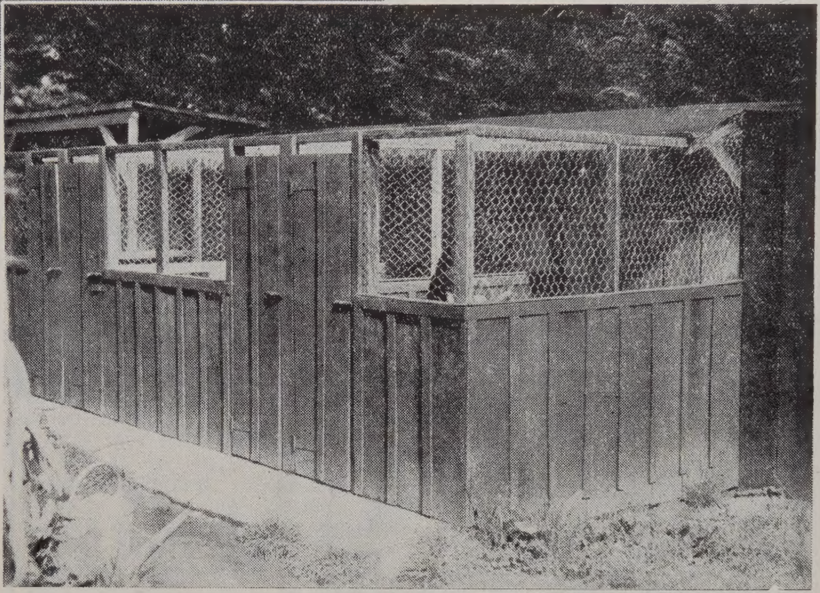


BAD QUARTERS



THE FARM DOG

By
A. D. G. M. LAING,
M.R.C.V.S., *Veterinarian,*
Hastings.



Roominess, comfort, and freedom from draughts characterise these quarters. Cleaning out is easy, too.

THE value of the working dog on the farm has never been higher than it is just now. This article suggests how dogs can be kept in good health and maintained for a long and useful period of life. Thoughtless or unsound management can shorten the life of a dog by a number of years. Furthermore it can render him much more liable to sickness and to the onset of distemper; in other words these suggestions are put forward from the economic angle.

THERE is available a considerable volume of experience in regard to the feeding of dogs from sources where really practical study and comparison have been possible. Examples of such sources are packs of foxhounds and racing greyhound kennels, where dogs are kept in large numbers and where they have to be in perfect physical fitness. In both these instances also periods of idleness occur. In other words working dogs of these two categories are kept under somewhat similar conditions to sheep dogs on farms and stations in New Zealand.

It has been stated that "the dog is naturally an animal of open spaces, full of life and energy, and thus taking a great deal of exercise." A **naturally** fat dog is an impossibility. The teeth of a dog are designed for holding and tearing meat and for crushing bones, that is to say, its natural diet under **natural conditions.** Food must further be in a concentrated form for a dog living under these conditions.

Do the conditions under which the working farm dog in New Zealand lives differ from natural conditions? The answer is "yes" when he is not doing daily work and "no" when he is working. But these answers are also governed by the fact that working dogs have to be kept under control at night time when they are not working, and therefore cannot find for themselves the dry sheltered living quarters which they would under natural conditions. These can and should be supplied by their masters, but as will be mentioned later in this article, it does not always appear possible to do so.

Full Diet when Working

It can therefore also be stated that during working periods the dog must have a full diet. That diet on a farm is best to be the natural one of flesh and bones. Bones are essential, as without them the digestive system of the dog cannot function satisfactorily any more than the digestive system of the cow could function satisfactorily without adequate roughage. As regards quantities, a sheep dog of ordinary size can be given up to 1½ or 2lb. of whole meat per day when in full work. Keeping the dog in good but hard condition is, however, the best standard of measurement.

Feeding once a day in the evening is a very common and a sound practice. **The custom, however, of not feeding the dog when he is not working for periods of two to three days cannot be too strongly deprecated.** Unlike the cow and the horse, which each carry a considerable store of undigested or partially digested nourishment in the paunch and the blind gut respectively, the dog carries no such store of undigested food. His physiology is in this respect exactly similar to that of man. We would not expect ourselves to go without food for two-

or three-day intervals just because we do not happen to have any work during that period. We do, however, if we run our lives on common-sense lines, eat a lighter diet when we are not doing heavy physical work. In the same way, the working dog which is resting should not be given a full diet, and should be fed only a light meal in the evening (but **every** evening). In the case of places with two or three dogs this meal may quite easily consist of household scraps and a little meat and bone helped out with vegetable and bread, meal, and so on. Approximately 1lb. can be given to each dog. In places where a large number of dogs are kept and household scraps are not available then a diet consisting of about a pound of a mixture of cooked potatoes, meal or pollard (if available), and meat scraps and bones in the proportions of 2, 1, 1, may be given. This will keep the dog contented and his digestive system functioning satisfactorily. It will also maintain his resistance to disease infections at the proper level, i.e., it will not mean any lowering in his vitality, such as occurs when long periods of starvation are habitually carried out.

Dry, Draught-free Quarters

The dog is an animal which, while it does not require to be pampered in any way in regard to housing, does need absolutely dry quarters free from draughts if it is to be kept in good health and give of its best in the way of work. The ideal is a dry kennel with a small yard attached. An example is given in the photographs with this article. This gives the dog reasonable freedom of movement, which is by no means as unimportant as many people may think. The dog, particularly the sheep dog, is an extremely intelligent animal and should be treated as such and not closely cramped and confined if he is to work well.

Where the provision of a yard is not possible then the sleeping quarters must be reasonably roomy and dry and not just sufficiently big for the dog to fit himself in. They should be easily cleaned and should be so cleaned out at regular intervals. It is preferable that some form of bedding be provided, which can be changed regularly, and they must be in a sheltered position with good cover. A dog kept, for instance, as in two of the photographs with this article, with little natural shelter, having to expose himself to wind and rain unless he lies in the cramped damp quarters of his kennel, will not be in the best fettle for work, will not live long, and will be readily subject to any infectious disease which happens to be going about.

A supply of clean drinking water should be available within reach of the dog when he is confined to his quarters. The necessity of this last is indeed obvious, apart from the humane angle.

General Care

It need scarcely be emphasised how important it is to take action as soon as any signs of ill health appear, particularly such as listlessness and loss of appetite. Some general points which may be of interest are:—

1. It is important from the point of view of health that the dog should have his coat in good order. If he is brought in from his work muddy and wet and tied up on a short chain under cramped conditions in a damp kennel, it is quite impossible for his coat to be healthy. In other words, reasonable time spent in grooming of the working dog is time well spent, and economically profitable.
2. On no account should antiseptics or dips containing carbolic be used to cleanse dogs, as they are particularly sensitive to the effect of carbolic acid.
3. Very hard dense bones, as from rabbits or poultry, may not be completely digested when broken up and swallowed, particularly by old dogs whose teeth are not good. In such cases intestinal blockage may occur. It is better therefore to confine the feeding as regards bones to those from sheep or cattle.
4. While the dog is confined he should have access to water. This is one of the advantages of the types of dog quarters illustrated. A dog which is thirsty when he is taken out to work will naturally drink at the first opportunity, and a stomach full of water (or of food, for that matter) does not help heavy physical work in any animal species.

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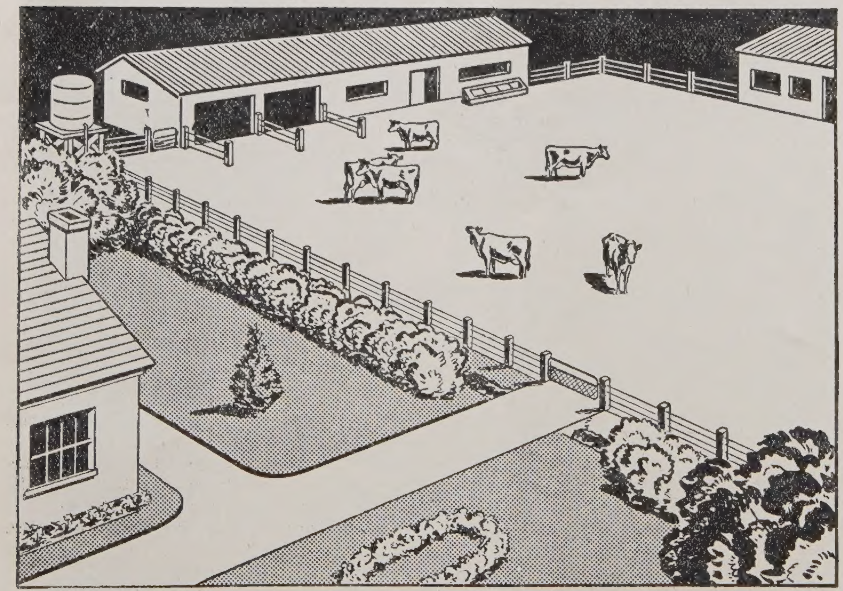

Yes, a good concrete yard, tank, milking-shed floor or piggery is a solid investment that does not depreciate. Instructions for concrete work on the farm will be sent on request. State what you wish to make.

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5. If for any reason the usual "dog-tucker" is not available, meat meal can be used as a substitute. Ten to twelve ounces daily, made into a thin soup with skim-milk and a proportion of household scraps and bones added, may be fed.

Diseases

First and most important of the diseases which affect the dog is distemper. **There is no necessity nowadays for any dog in New Zealand to get distemper.** An efficient vaccine is available, and is in regular use in various parts of New Zealand, and dogs which have received this vaccine do not get distemper. Great work has been done by the various dog trial associations in organising its use. The cost is not great (17/6), particularly in comparison with the present value of good working dogs. The best time for administration is at the age of about three to six months, but it can be given at any age. It should be noted that this vaccine is under the control of the veterinary profession. It is important that it should be so, as if it is not properly used, or if it is given to a dog which is in any way unhealthy, most undesirable consequences may result.

The inoculation consists of two doses, one of virus and one of immune serum. The former is the actual distemper infection, and so the necessity for veterinary supervision of all distemper inoculations will be readily recognised.

The disease of distemper is caused by what is known as a virus, that is to say it is a form of infection which is so small that it cannot be seen under even the most powerful microscope. Its presence can, in fact, be deduced only by certain tests, that is, apart from the symptoms of the disease itself in the animal. Infection occurs through discharges and secretions from animals which are already ill, and young animals are more susceptible than older animals.

Approximately four days after infection there is a rise in temperature associated with vomiting and diarrhoea. After a couple of days the temperature may drop to normal. This is the danger period. If the first stage has not been observed by the owner, and the animal is worked hard, particularly in the cold or wet, then the severity of the attack will be greatly increased. After two more days there is a slower rise, which may be prolonged over a course of two or three weeks. If diarrhoea has not already set in, it will set in at this stage and blood may be present. There will be a discharge from the eyes and lung symptoms may develop — pneumonia and so forth. There may be an eruption on the skin of the abdomen in the shape of reddish pimples, and at this stage too the nervous symptoms which are such a distressing consequence of distemper may also set in.

It should be noted that many of the symptoms described above are due to what is known as secondary infections, which have been able to take their hold only because the primary virus infection has already invaded the animal.

Before the development of what is known as the sulphonamide group of drugs the mortality from distemper used to be in the neighbourhood of 50 per cent. Nowadays, however, **particularly if the condition is diagnosed at an early stage (note again the preliminary symptoms described above)**, and recourse made to a veterinary surgeon, owners will find that the use of one of these "sulpha" drugs will give excellent results. One good aspect also is that they appear to be effective in preventing chorea, the nervous and paralysis symptoms which were a frequent sequal to a distemper attack and which made dogs so affected useless for work.

Treat Early

It is, however, most important that where distemper has occurred treatment on proper lines should begin at the earliest possible moment. This should consist in:—

1. **Isolation in warm dry quarters free from draughts.** Wash the hands in antiseptic after handling distemper cases and before handling healthy dogs.
2. Feed a light diet, such as warm broth made from meat, warm milk, or warm bread and milk, or gruel, but do not allow excess of water, as this is bad in stomach and intestinal infections. If the patient is so very weak a few spoonfuls may be fed by hand, but do not force unduly. Three to four drops of stimulant (brandy or whisky) in each teaspoonful may be added to help the animal over the crisis of the disease.
3. Avoid drastic purging. Two tablespoonfuls of medicinal liquid paraffin may be given if desired and needed.
4. Get veterinary advice as soon as possible, by telephone if the distance is too great for a visit. **There is no part of New Zealand to-day where a moderate toll charge will not enable a farmer to discuss his stock troubles with the man best qualified to help.** If requested, and for a small extra charge, the Post Office will make the call a "personal" one, ensuring that the call will not go through until the veterinary surgeon called is available at the other end.

Above all it is earnestly desired to suggest to owners that recourse should not be made to quack or "old wives'" remedies which are sometimes advised by people who should know better. If they value their dogs, then the dogs are worth treatment on proper lines.

Mention has not been made of what is known as the anti-distemper serum, which is prepared from the blood of dogs which have been rendered immune to distemper. An injection has the effect of rendering the dog immune to distemper for a period of approximately three weeks. When dogs have not been inoculated and have been exposed to infection it is good practice to have them all injected with distemper serum.

While pneumonia and bronchitis are a common symptom of distemper, lung troubles occur, and may be fatal, without distemper infection being present, and dogs which have been immunised to distemper can die from such ordinary pneumonias. **There have been cases of the very efficient anti-distemper inoculation being brought into disrepute by thoughtless owners whose dogs have died from conditions other than distemper.**

It is impossible in a short article to discuss canine ailments and diseases to any extent, but skin conditions and hydatids should be mentioned.

Skin Troubles

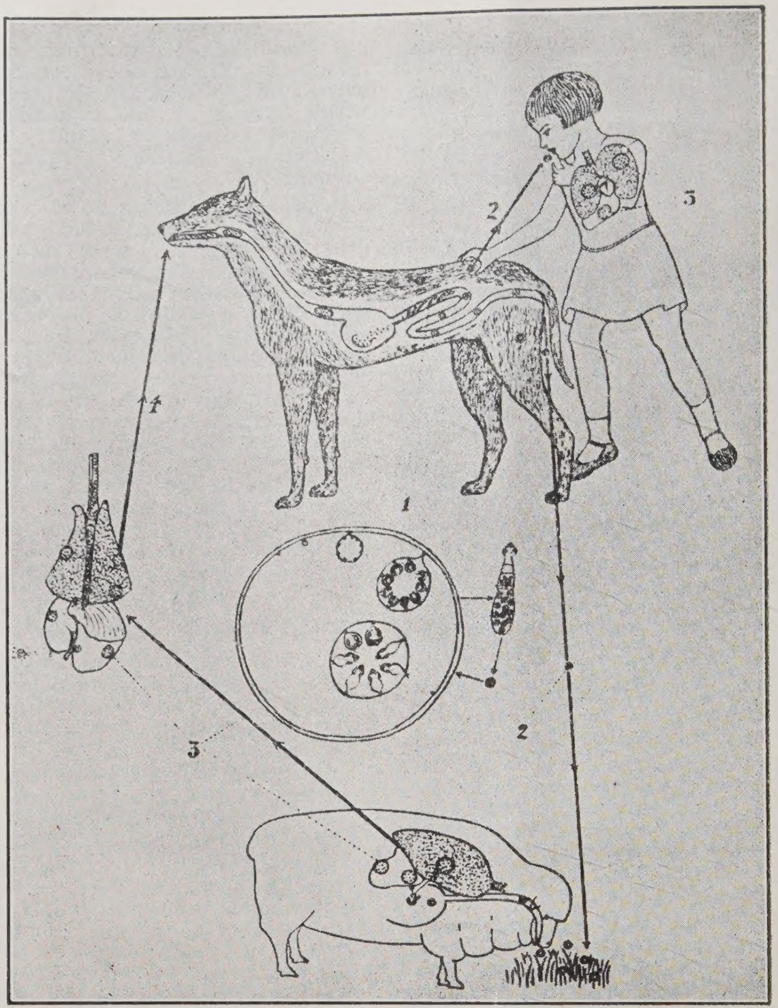
The dog is liable to skin troubles, which may be due to dietary causes or to infections such as mange. The possibilities are wide, and it is worth while getting veterinary advice. Canine ringworm, for instance, is communicable to human beings. Pending that, however, preliminary treatment on general lines might be:—

1. Isolation, rest, light diet, and an aperient, such as two tablespoonfuls of medicinal liquid paraffin.
2. Change the bedding and clean out the sleeping quarters. Get rid of fleas. There are many excellent proprietary soaps and preparations on the market, made by reputable firms, for this purpose.
3. Clip the hair round the sore place **until a healthy skin area is reached all round.** Then wash thoroughly with any standard antiseptic at the strength advised for the treatment of wounds, removing any scabs. The area may then be dressed with ordinary sulphur ointment, obtainable from any chemist.

IMPORTANT — DIPPING RAMS

Sheep Dip Manufacturers call farmers' attention to the dangerous practice of dipping rams too late in the season. To avoid the likelihood of undesirable after-dipping effects, it is essential that rams should be dipped early in the season and well before flushing occurs.

No responsibility will be accepted for any damage or loss sustained owing to this instruction not being carried out.



LIFE-CYCLE OF THE HYDATID TAPEWORM *(Taenia echinococcus).* **(1) An infested dog passes ripe segments containing eggs in its droppings to contaminate pasture and water-supply. (2) Animals (sheep, pigs, and cattle) grazing infested pastures pick up the eggs from the pasture or from the water-supply. (2) Human beings may be infected through fondling dogs whose coats are contaminated with eggs. (3) The eggs develop into cysts in the liver and lungs of the animals. (4) Offal containing cysts when eaten by the dog again produce the tapeworm in the intestine of the dog.**

Hydatids

Hydatid disease is a condition in which a large bladder or cyst appears in the body. Liver and lungs are common sites in the human being, but any part may be affected. Such cysts may have serious and even fatal consequences, and can in any case be dealt with only by a **major** surgical operation.

It is regrettable that New Zealand, with one of the finest general health records in the world, **has also one of the highest incidences of hydatid infection in the world.**

Human hydatid infection arises solely from the dog, and it is within the power of dog owners in New Zealand, without very great extra trouble to themselves, to rid our country of this menace, and they are the only people in New Zealand who can do so.

The dog becomes infested with a very small tapeworm, known as the *Taenia echinococcus.* It is only about ¼in. long, and dogs have been known to carry 800 without ill effect to themselves. Huge numbers of eggs are passed out with the dog's excreta. These are invisible to the naked eye and when dried adhere to the dog's coat, blow about, contaminate pastures and vegetable gardens. If swallowed by a human being, e.g., a child playing with an affected dog, a shepherd rolling a cigarette, and so on, these eggs develop into the swellings described.

When the eggs are swallowed by cattle or sheep similar cysts develop in them in the same way. If these cysts are eaten by dogs, then from them, in the dog, the tapeworm develops, lays its eggs, and the eggs are swallowed by the other host (man or stock) and so on. **Sheep and cattle slaughtered in New Zealand show an incidence of about 60 per cent. of hydatid infection** (see illustration).

There are two simple methods of attack, presenting little trouble:—

1. Feed the dog only on food free from cysts, i.e., healthy meat. If livers and lungs must be fed, then boil first. It is in fact a Stock Act offence to feed unboiled offals, but it is unneighbourly, which is more important.
2. Drench the dogs **every quarter** with the arecoline hydrobromide dose issued with the dog licence, with which full instructions as to use are issued. This will kill any tapeworms in the dogs. Destroy by burning all dog faeces after the dose has been administered.

The above measures are effective if thoroughly carried out.

Summary

A summarised guide to care of farm dogs is contained in the following suggestions:

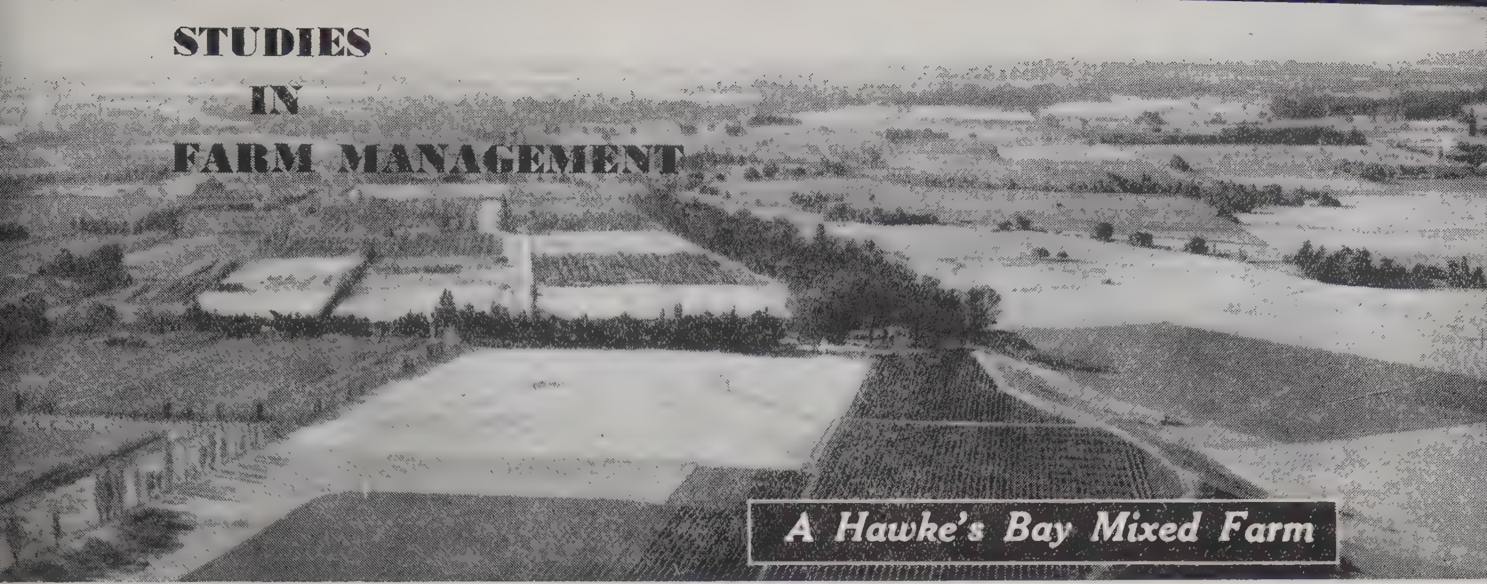
1. The necessity for regular daily feeding, but only light diet when not working.
2. Water to be **always** available.
3. Coats to be kept reasonably clean.
4. Provision of clean dry housing, free from draughts, and if possible a small yard.
5. All dogs of any value should receive the anti-distemper inoculation.
6. Simple preliminary treatment for skin troubles.
7. The farm dog is the sole spreader of the hydatid menace, **and the only people who can tackle it are the dog owners.** It is suggested that the measures advised are not onerous, and that considering the grave consequences liable to arise those owners are not justified in neglecting to carry them out.

Acknowledgments

The writer wishes to record his thanks to Mr. John Cameron, Hastings, for carrying out the photography in connection with this article (except in one instance), and to Mr. L. Baker, Rissington, Hawke's Bay, the management of the Whakatu Freezing Works, and others in various parts of the bay on whose properties the photographs were taken.

Don't

neglect internal parasites in poultry. Full information is available in the Department's free bulletin No. 19.



STUDIES IN FARM MANAGEMENT

A Hawke's Bay Mixed Farm

By

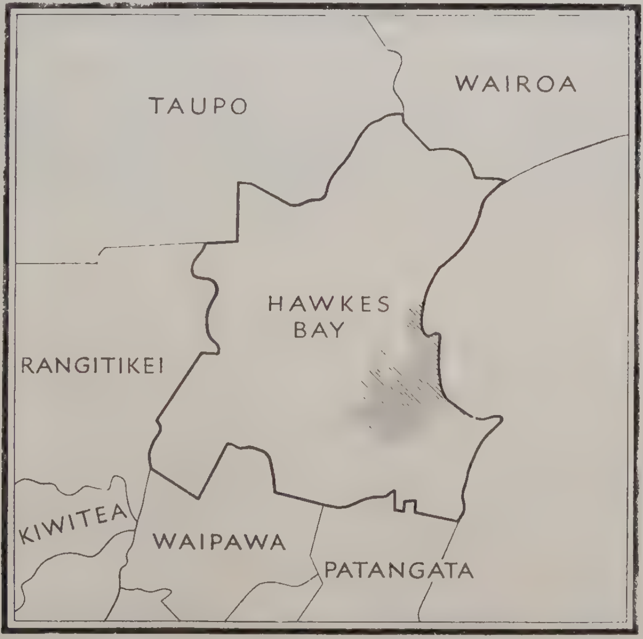
E. M. BATES,

Instructor in Agriculture,
Hastings

THE Heretaunga Plains, situated in Mid-Hawke's Bay, are well known for their high fertility and intensive farming activities. Centred in Hastings and extending to the seaport of Napier in the north, the Plains cover some 85,000 acres of closely-settled land, bounded on the east by the South Pacific Ocean, and on other sides by low, fertile hill-country. Orchards, market gardens, grass seed production, fat lambs, hot summers, droughts and floods—these are the high lights of the picture presented by this natural centre of the Hawke's Bay farming industry.

THE present site of the Plains, once an old sea basin, has, over a long period of time, been infilled by sediments mainly derived from lime-bearing muddy sandstones, limestones, and from the greywacke (hardened sandstone of the ranges) brought down by the three large rivers, Ngaruroro, Tukituki, and Tutaekuri. To-day the land surface rises gently westward from near sea level to an elevation of some 200ft. at the head of the Plains along the Ngaruroro River. The building up of the land surface has by no means ceased, and giant river works have been constructed to confine the rivers to their courses.

Strong flows of artesian water are obtained over most of the Plains south of Napier by drilling into water-bearing shingle beds lying at depths ranging from 20 to several hundred feet.



The shaded area indicates the Heretaunga Plains.

Soils

The soils and farming of the Heretaunga Plains have been the subject of a detailed survey published some time ago as bulletin No. 70 issued by the Scientific and Industrial Research Department, Wellington. In this all soils are subdivided under four main soil types: (1) recent; (2) meadow; (3) peat; (4) alkaline. Many of the soils are silt loams or clay loams, although land of sandier texture, drying out more rapidly, is found near the main rivers. Some of the soil appears to show little or no visible response to lime or superphosphate in the pastures, but in general light applications of both are regarded as payable. The meadow types are extensive from the vicinity of Hastings to the sea, and are good general-purpose types. Most of the recent types dry out more rapidly than the meadow types. There is also considerable variation in texture and drainage. A narrow belt of poorer soils also of recent type occurs two or three miles south-west of Hastings. These are derived from coarse pumice or pumice sands which were brought down by the Ngaruroro River at the time of the Taupo pumice eruption, which covered most of the central North Island area with volcanic pumice ash many thousands of years ago.

Peat soils adjoin this narrow belt at the southern end of the Plains by the foothills.

Alkaline soils are found mainly south of Napier to the vicinity of the Tutaekuri River. They are silt loam or clay loam in texture and contain a

AERIAL VIEW SHOWING SITE OF FARM.

slight amount of salt. Soil analyses have shown the phosphate content to be lower than is the case with most of the Plains area. Drainage is, without doubt, a great limiting factor of the Heretaunga Plains. Wide areas are subject to a high water-table in early spring. For grass-seed production and shallow-rooting crops this is in some respects an advantage, because it offsets droughty climatic conditions to some degree. One may envisage in the future comprehensive drainage and irrigation work to enable the Plains to reach maximum production and yet overcome periods of drought.

Climate

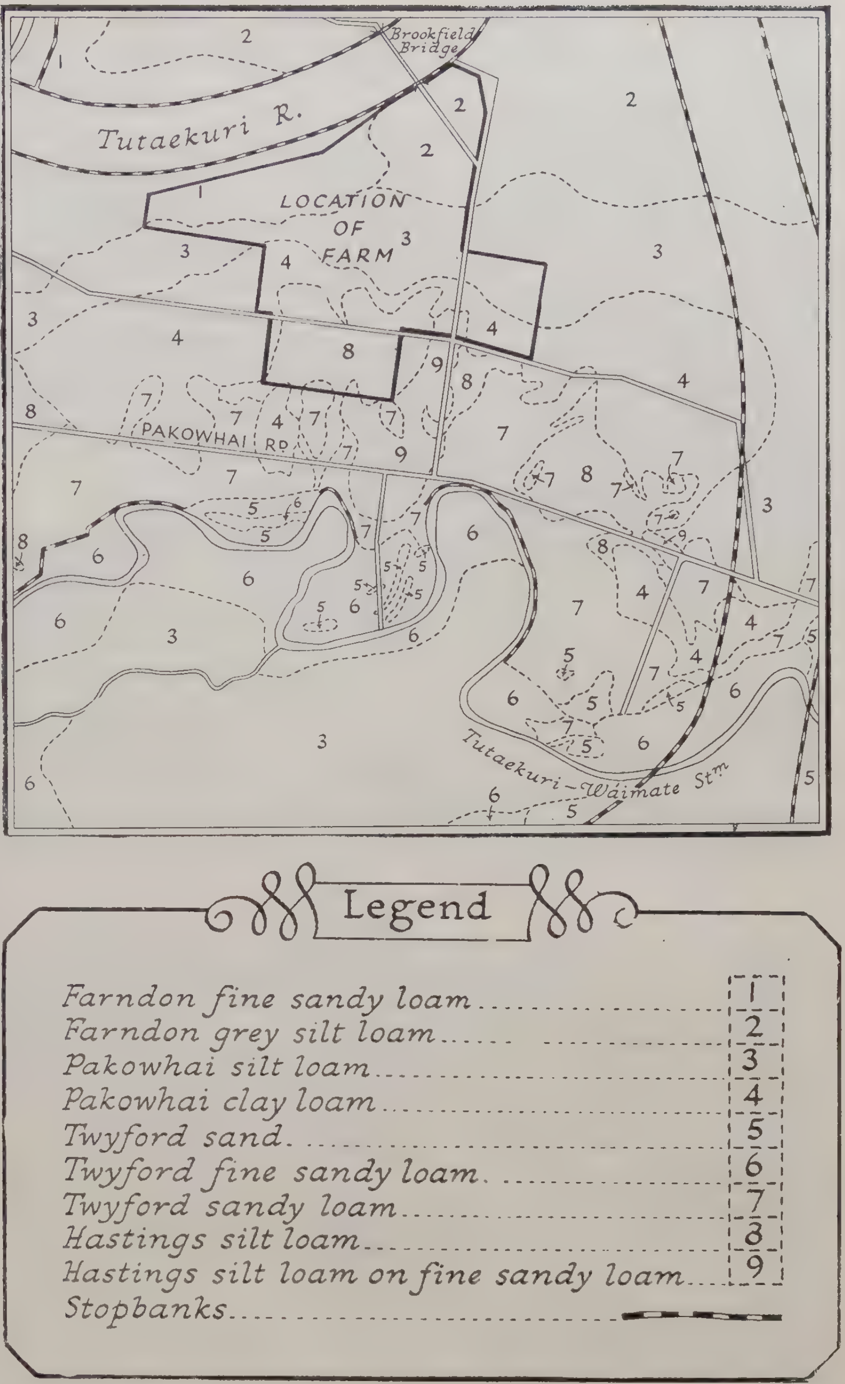
The abnormally high fertility of the land is also offset to some extent by climatic conditions which modify the types of farming practised. Relatively severe frosts may be experienced in the winter and unseasonable late or early frosts sometimes occur and cause considerable losses in orchards and market gardens. High temperatures are the rule in summer, showing from September to April one of the highest mean maxima for New Zealand. Rainfall varies considerably, and although the average is under 33in. per annum, variations in the annual rainfall figures of 20.5in. and 59.5in. have been recorded. Monthly rainfall totals do not vary as much as might be expected between summer and winter or from month to month. However, in effect, winter rainfall is well distributed, while rainfall from October to May is frequently erratic. Summer droughts are usual and summer rains inclined to be heavy downpours. When major floods are experienced they usually occur between January and April, although big floods have occurred in other months.

Mean Annual Rainfall for Hastings (40 years).

	In.
January	2.4
February	2.8
March	2.6
April	3.2
May	3.4
June	3.1
July	3.7
August	3.0
September	2.3
October	2.0
November	2.2
December	2.1
	32.8in.

Drying winds ranging from north to west from across the land mass of the North Island are frequent in summer and spring, with generally relatively low humidity. This has an important bearing on dry conditions setting in earlier than in most other districts. On lighter country early dry conditions cause a severe setback, if occurring before cattle feed has come away in the spring. Growth may be greatly reduced, affecting dairy production particularly. The low humidity general over the summer period has, however, an important bearing on the natural control of fungous diseases in fruit and agricultural crops alike. The pastures, too, are maintained in a clean and healthy condition, and a rapid and even ripening of the ryegrass seed crops usually results.

In general the climate is suited to the fattening of stock in conjunction with ryegrass seed production, although dry conditions necessitate the provision of supplementary greenfeed on farms which are liable to dry out. Lucerne is generally used for this purpose as well as to provide hay for the winter period.



Land Utilisation

Land utilisation of the Heretaunga Plains is very diversified, and it is noteworthy that only a boundary fence may separate very dissimilar farming pursuits, which cater for the very varied demands of local industry.

The high fertility of much of the Plains area and the generally favourable climatic conditions enable considerable latitude in farming operations, but limit the use of those crops particularly susceptible to frost damage.

There is an urban population of some 40,000 people, many of whom obtain their livelihood by following various seasonal occupations, and labour is normally available as required to meet all classes of production. Rail, road, and shipping facilities are excellent. The facilities with regard to the handling of livestock are particularly good. The Plains are surrounded by hill country from which are drawn requirements of store sheep, breeding ewes, and cattle for fattening purposes, mainly through the large Stortford Lodge saleyards, centrally placed at Hastings. A record yarding of 49,300 sheep on February 2, 1940, is illustrated. The two freezing works handle up to 22,000 sheep and lambs per day at the height of the season. In the autumn—the busy time with cattle—they can deal with about 500 cattle a day.

Within mainly an 8-mile radius of Hastings, intensive market-gardening, orcharding, and grape-growing not only supply local markets, including canneries and dehydrating works, but also provide a large surplus for outside markets, including overseas.

Dairy farming is not so extensive, due to the more lucrative returns from other farming pursuits, and the vagaries of the seasons. Arable farming, too, is practised to some extent, but breeding and fattening of lambs and fattening of dry sheep, together with production of ryegrass seed crops,

Foothills adjoining Heretaunga Plains

Stortford Lodge Saleyards

is of major importance in the economic farming of the Plains.

TYPICAL FAT LAMB-RYEGRASS SEED PRODUCTION FARM.

For the purpose of this review the estate of Mr. C. E. Tattersall, Pakowhai, is taken as a more or less typical fat lamb-ryegrass seed production farm on fertile soils and under good management. The total area of the property is 357 acres, which is an average size. All 32 paddocks are flat, at an elevation of 20 to 30ft. above sea level. Adjoining the Tutaekuri River at the Brookfield bridge, access by road is good, the property being conveniently situated 5 miles from Clive, 8½ miles from Napier, and 6 miles from Hastings.

A regular and plentiful supply of water for stock is obtained from nine artesian bores piped to water troughs in surrounding paddocks. The water-table back from the river is high, and many open drains have been constructed. A main council drain with a fall of 8ft. from road to road requires enlarging to facilitate drainage of a large area.

Soil

The soil type changes from a sandy loam nearest the Tutaekuri River to a silty loam with an increasingly high water-table. The sandy loam which has formed on the original fine sandy river silt took about 3 to 4 years to develop, mainly by heavy winter feeding of stock on the areas. It now grows good root and cereal crops and holds grass fairly well, although liable to grass grub attack. The silty loams are excellent meadow soils of high fertility for cropping, grazing, and grass seed production.

History

The property was taken over in 1914, and at that time was liable to frequent flooding, up to seven floods being experienced in a year. In 1932 a high stopbank was erected, since when there has been no further river flooding. When taken over 200 acres of 320 was "a solid mat" of Indian doab. Of this there is now no sign in the ryegrass-white clover pastures sown down and subjected to heavy stocking assisted by topdressing, although it was found that the lighter soils of the property had a tendency to revert to Indian doab under dairying.

In 1914 the farm, then of 320 acres, carried only 400 sheep and a dairy herd of 40 cows. The winter carrying capacity on the present area of 357 acres with winter feeding is 2,800 sheep and 60 head of cattle.

Management of Stock

The flock is maintained by the purchase in February of about 1,500 four- and five-year-old ewes, which, after dipping in February, are mated with Southdown rams. Lambing percentages are approximately 100 per cent., and all lambs except 7 or 8 per cent. are sent fat to the works off the mothers. Following the first draft of lambs in November, regular drafts of fat stock leave the farm every week to 10 days. No store stock are kept, but a large number of dry sheep are bought at the saleyards as required for fattening from October to April, according to the feed available. About 5,700 sheep and lambs and 200 head of cattle in all were fattened during last season.

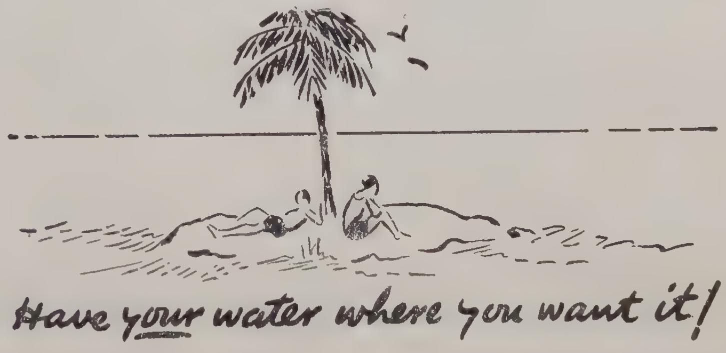
Dry sheep are shorn at the end of October, and three weeks off the shears the first draft is away. This actually is about three weeks later than is usual on similar farms, as the stock are required to keep in control the vigorous pasture growth, especially vigorous on paddocks with a high water-table providing good summer grazing conditions. In December the wet ewes are shorn, mouthed, and rejects fattened, while about 500 ewes are kept back for breeding the following season. By the middle of May all surplus stock are off the farm. The rough feed is cleaned up with cattle and the winter feeding programme commenced.

Winter Feeding

Winter feeding is regarded as all important, and the foundation of the management policy is based on the saving of a large winter reserve of roots and lucerne hay. This has enabled the buying in of store stock when values are relatively low. Owing to the large number of stock carried over the winter, feeding out becomes the major operation on the farm, with permanent labour employed to great advantage. Approximately 100 tons of pumpkins, 350 tons of mangolds, and 70 to 80 tons of lucerne and meadow hay, besides ryegrass straw, are fed out from towards the end of May well into September. During August cattle feeding is particularly heavy, and the grass harrows are kept moving to spread droppings. Cattle are bought at any period according to pasture growth and price. They are fattened mainly in the summer and sent off in the autumn. The heavy feeding as practised is unusual on the Plains, but the soundness of the policy is clearly reflected in the stock fattened off the property and in the general excellence of the pastures and crops, even on the poorer soils, which have consolidated well and been rapidly built up in fertility under this treatment. Last year, which was not the best, 370,000lb. of meat was sent off the farm fat. In addition, the wool clip was 25,000lb.

Ryegrass Seed Production

Ryegrass seed production and fat lamb raising are complementary to each other for the efficient utilisation of the pastures. The general practice on the Plains is to concentrate the ewes and lambs on certain paddocks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during the spring flush and to shut up the balance of the farm early in November for a ryegrass seed crop. If a white clover seed crop is required, perhaps due to weakness of ryegrass and dominance of clover, a light hay crop is cut early and the aftermath of white clover left for a seed crop. Reduction in ewe flocks with increase in dry sheep sold as fats at the end of October is aimed at by some farmers to close up a still greater proportion of their farms for a ryegrass seed harvest. Such is not the case with the farm under review, where the policy is to avoid closing a large area for harvesting at the expense of the pastures, and paddocks are cut only every 3 or 4 years so that vigour will not be impaired. Actually stock for fattening are often being bought in at the period when areas are being shut up. Stock, however, has never been sold to close additional areas for ryegrass.

Use of Certified Seed

All pastures on the farm have ryegrass-white clover swards. The usual seed mixture in sowing down is 2-2½ bushels ryegrass with 1-1½lb. white clover per acre. Several paddocks have never been ploughed and some have been down for 50 years on the strongest land. Most have been entered for certification at some time since 1929. When resowing only the best strains of certified ryegrass seed that could be procured have been used with mother standard white clover. At present 14 acres are in Nucleus stock ryegrass, 5 paddocks totalling 36½ acres are in Government Stock ryegrass, and 4 paddocks totalling 34 acres are in pedigree seed harvested off the property.

Grass Seed Harvest

The areas to be closed are first cleaned up with about 900 dry sheep, mainly wethers. Paddocks are stocked with about 25 to the acre and shifted from paddock to paddock over the total area, which is in the vicinity of 50 acres each season. While being stocked the area is also harrowed before being closed from November 6 to November 20.

About the first week in January the ryegrass is cut with the mower, the paddocks ripening within a week of one another. Harvesting takes place about 10 days later by means of the farm pick-up mill. Further fattening is made off the aftermath, but harvested areas are lightly stocked during the following winter as well as being autumn topdressed with superphosphate. No white clover seed-crop is harvested on this farm.

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Average yield of machine-dressed ryegrass in seasons:

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1930-31	8 " " "
1939-40	14 " " "
1943-44	21 " " "

First harvest and old pasture yields are averaging 40 and 20 bushels per acre machine-dressed seed respectively. A first harvest certified crop off 21 acres one season yielded 220 sacks of farmer's dressed seed.

The average yield of old pasture ryegrass for the Plains is approximately 12 bushels per acre machine-dressed seed.

Cropping

Preparation of the ground for mangolds and pumpkins commences in September. The least productive grass paddocks are disced a number of times, then ploughed and a good seed-bed obtained. A rotation of mangolds, barley, and back to grass is usual. Mangolds are sown in the middle of October, and maize and pumpkins early in November. During the war years garden pumpkins, potatoes, maize, and barley are also grown for cash crops.

FOR WINTER FEED REQUIREMENTS.

Acreage.	Crop.	Approx. yield. (tons)
4½	Cattle pumpkins	100
4½	Mangolds	350
9	Lucerne (hay)	50-60
10	Meadow hay	20
	Threshed grass seed straw	20-30

FOR CASH CROPS.

Acreage.	Crop.	Approx. yield. (tons)
5	Triamble pumpkins ..	45
4	Potatoes	45
		(bushels)
5	Maize	380
15	Barley (Australian) ..	850

Lucerne provides four cuts a year. These are all made into hay. Both November and February sowings have been successful. With the autumn-sown lucerne ¾ bushel of barley was also sown. Spring sowing in the district is standard practice.

Implements and Labour

All cultivation work is carried out with a tractor and three draught horses. There is a good range of farm implements—a header with pick-up attachment for grass seed harvesting, and a baler for hay. The hay shed holds 2400 bales of hay. If labour is available, threshed grass seed straw is baled.

The farm has been managed since 1920 by Mr. R. Tattersall, assisted by two permanent employees. Casual labour is employed only to assist with such work as thinning and weeding of root crops, harvesting of grass seed, and baling of hay.

Farm Shelter

Most of the shelter belts are of poplar, which were on the property when taken over and afford very poor shelter. They are untidy in winter, the wood is too soft for farm use, and the trees appear to impoverish the ground for about a chain on either side. Boxthorn had been planted with the poplars in some places to improve their effectiveness. Macrocarpa affords excellent shelter, and when grown alongside the drains there is no weed growth underneath and such drains remain clean. The practice is adopted of growing a row of *Pinus insignis* behind the macrocarpa, with a further row of gums behind the pines.

Shelter belts are required for protection from the west and south to allow for most sunshine and drying winds. On this property there could be too many trees, as these would tend to interfere unduly with the drying out of the grass seed crops.

Conclusion

The soils on the farm are not materially different from other fertile soil types of the Plains, but the water-table is higher than usual and normal dry conditions are, if anything, favourable to the farming operations and heavy carrying in summer. Such is not the case on farms of the Plains which are liable to dry out badly, and it is out of the question to stock in the same way in summer even with supplementary greenfeed. The results achieved on this property certainly give cause for reflection and are in large measure due to careful planning of all farm operations combined with sound stock management and a good deal of hard work.

The monetary returns of a fat lamb farm are associated particularly with the farmer's business ability. He must be systematic and methodical. He must know the markets and values of livestock, and be able to buy to advantage, for this will make all the difference at the end of the financial year.

Acknowledgments

Thanks are due to the Director, Soil Survey Division, Scientific and Industrial Research Department, for data in the two maps, and to the Lands and Survey Department for drawings of the maps.

All photographs are by N.Z. Aerial Mapping, Ltd., Hastings.

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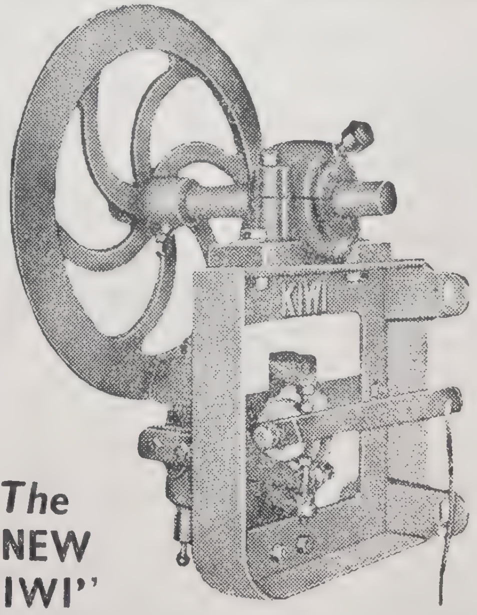

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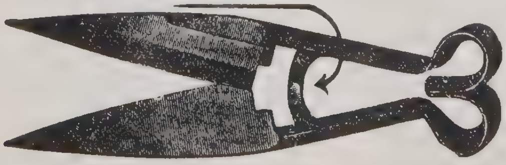

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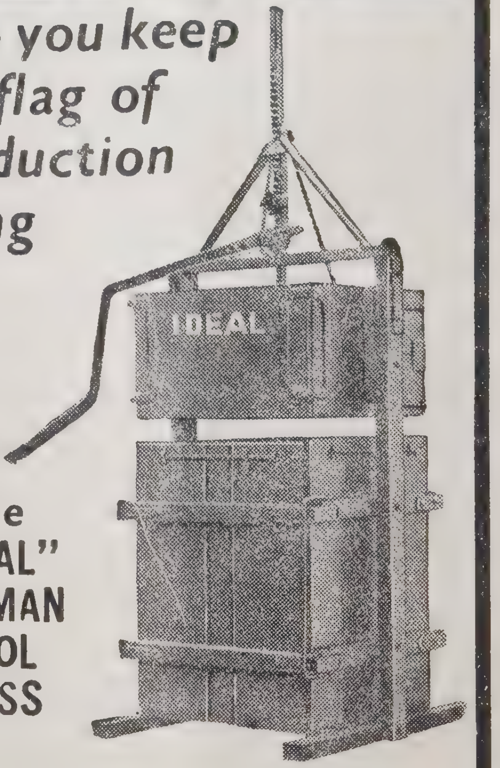

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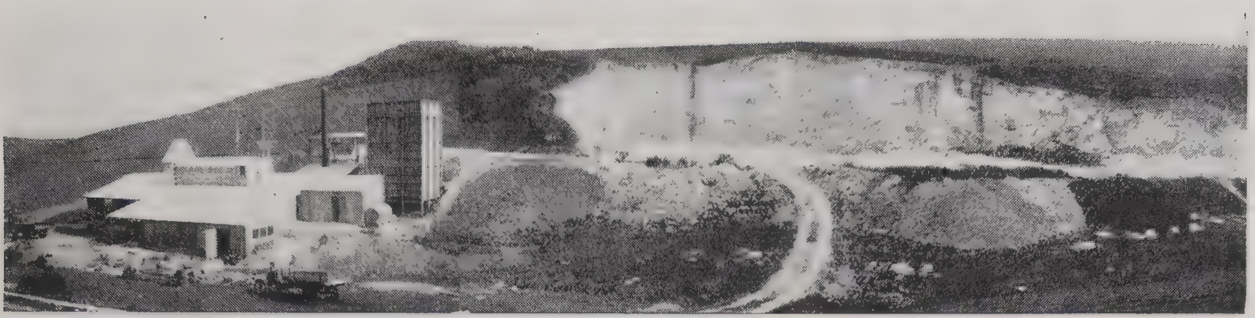
The Lime Requirement of Soils



— By —

E. B. DAVIES,
Agricultural Chemist,
Chemistry Section, Soil Branch,
Dept. of Agriculture.

The Soil Survey Division of the Department of Scientific and Industrial Research has concluded from its lime survey of the North Island of New Zealand that the sum total lime requirement is an initial dressing of 2,000,000 tons of carbonate of lime, followed by annual dressings of 500,000 tons. This they regard as a conservative estimate. Compare the total output of crushed limestone from the limeworks of the North Island—319,935 tons (1943). Under present conditions transport and delivery problems constitute the major limitation of the farmers' liming programme. It becomes important that what lime is available goes to the place most in need of it. Some information about the principles underlying the determination of lime requirement may, therefore, be of interest, and it is with these that the present article will deal. The use of lime in agriculture has been very fully discussed already in the "Journal of Agriculture" (1), and it is not proposed to cover the same ground again. To develop the subject adequately it has been found impossible to avoid a certain use of technical terms. These are, however, defined as the article progresses, and the reader can readily refer back, if necessary, to the explanatory paragraphs.

Acidity

The estimation of lime requirement is closely connected with soil acidity, and in introducing the subject it will be necessary to convey some idea of the general nature of acids. The minutest portion possible of a substance is known as a molecule. The molecules of all acids have one thing in common—they all contain a hydrogen atom. This is the essential characteristic of an acid. The hydrogen atom, moreover, must be combined in a special way, which enables it to be exchanged for atoms of other substances. Thus if spirits of salt (muriatic acid) is allowed to act on zinc, the zinc takes the place of the hydrogen, which is given off as a gas. When an acid is dissolved in water these hydrogen atoms tend to become separated from the acid molecules, but still stay in solution in the form of what are called hydrogen ions. We may therefore picture such a solution as containing an enormous number of molecules, a certain proportion of which have divided up liberating hydrogen ions. The amount of acid depends on the total number of hydrogen atoms, but the acid strength or intensity is determined by the number separated off in the manner described. This distinction between amount and strength is important. In a solution of a strong acid almost all the hydrogen is in the form of ions—in a weak acid very little. Spirits of salt is a typical strong acid, while boracic acid will serve as an example of a very weak one.

Base Exchange Capacity

The very fine material in a soil usually referred to as the clay fraction has the property of adsorbing or binding such substances as lime, magnesium, and potassium, which are conveniently referred to as bases. It also adsorbs hydrogen. Any particular sample of soil has a definite capacity—"base exchange capacity"—for adsorbing in this manner, depending to a considerable extent on the percentage of clay and organic matter present. The term "base exchange capacity" is applied because the various adsorbed bases may be exchanged for others or for hydrogen.

Base Saturation

In any soil the base exchange capacity is satisfied either wholly with bases or partly with bases and partly with hydrogen. In the former case the soil is termed "saturated," while in the latter the proportion of bases is indicated by the percentage saturation. Thus a soil 50 per cent. saturated would contain exchangeable bases and exchangeable hydrogen in equal proportions. Most New Zealand soils are well below 50 per cent. saturated.

The Soil an Acid

The exchangeable hydrogen can, to a very limited extent, separate off in the soil moisture in the form of ions in the same way that the hydrogen of an acid may separate off in solution. It follows, then, that an unsaturated soil may be regarded as an acid—a very weak one, since only a

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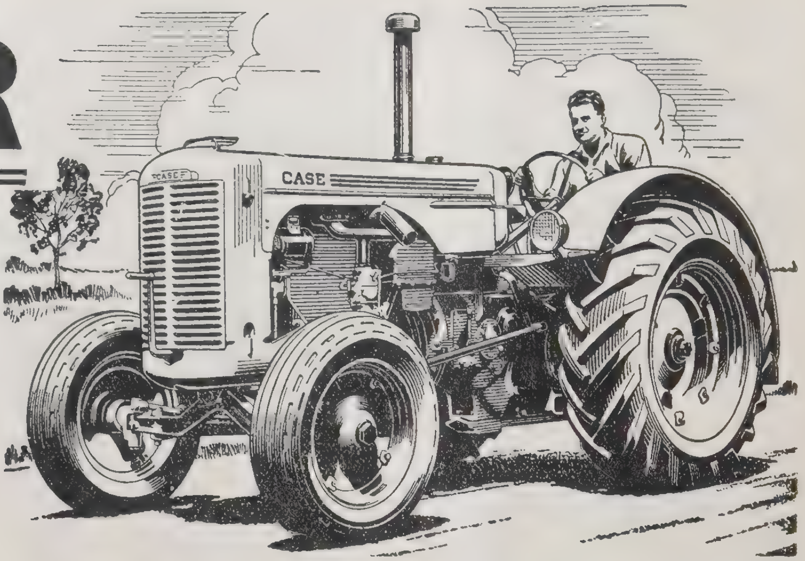

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small proportion of hydrogen ions are freed.

Strength of Acidity

Some plants can tolerate a much greater degree of acidity than others. It may be more correct to say that those conditions in a soil associated with high acid concentrations are more inimical to the growth of some plants than others, but it is convenient to express the situation in terms of acidity. Before the optimum conditions of acidity for various plant species can be expressed it is necessary to have some scale of values to serve as a measure. We have available for this purpose what is known as the pH scale. The H stands for hydrogen, the scale being based on the concentration of hydrogen ions—those free-lance hydrogen particles already described.

It is a back-to-front kind of scale, for the smaller the numerical value the stronger the acidity, just as with a wire gauge the smaller the number the stouter the wire. The scale runs from 0 to 14, pH 7 representing neutrality. Values below 7 indicate acid conditions, above 7 alkaline. Soils may vary in pH from about 3.5 to 9, but the general range most favourable for ordinary crops is from 6.0—7.5. The significance of the more usual values as far as the soil is concerned is as follows:—

pH.

4.5 and lower—very strongly acid.
4.5 to 5.2—strongly acid.
5.3 to 6.4—medium acid.
6.5 to 6.9—slightly acid.
7.0 —neutral.
7.1 to 7.5—slightly alkaline.
7.6 to 8.2—medium alkaline.
8.3 to 9.0—strongly alkaline.

A peculiar feature that must be borne in mind is that each decrease of 1 unit in pH value represents a ten-fold increase in acidity. Thus a soil of pH 5 is 10 times as acid as one of pH 6. A pH of 4 represents 10 times the acid intensity of pH 5, and 100 times that of pH 6. This characteristic enables one to indicate with conveniently small numbers the important little differences near neutrality and also the relatively enormous hydrogen ion concentrations of mineral acids.

Optimum pH for Growth

Some lists of optimum values follow (2). Most plants grow well near neutral conditions, but they vary in their acid tolerance. To appreciate these differences in tolerance it is necessary to remember from what has been said above that the pH range 5.0—7.0, for instance, is 10 times as great as the range 6.0—7.0.

Field Crops:

Barley	6.5—7.8
Sugar beet	6.5—8.0
Lucerne	6.2—7.8
Rape	6.0—7.5
Maize	5.5—7.5
Wheat	5.5—7.5
Oats	5.0—7.5
Flax (linen)*	5.0—7.0

*N.Z. experience points to heavy liming being inadvisable before a linen flax crop.

The crops towards the foot of the list can grow well in quite acid conditions, and on an acid soil would not require the heavy liming that successful growth of barley, for instance, would call for.

Grasses:

Italian rye	6.0—7.0
Perennial rye	6.0—7.0
Cocksfoot	6.0—7.0
Sweet vernal	6.0—7.0
Timothy	5.5—8.0
Kentucky bluegrass	5.5—6.5
Chewings fescue	5.5—6.5
Fog	5.0—7.5
Browntop	4.5—6.0

Clovers:

Bokhara clover	6.5—7.5
Red clover	6.0—7.5
Subterranean clover	6.0—7.0
White clover	5.6—7.0
Alsike	5.5—7.5
Crimson clover	5.5—7.0
Haresfoot trefoil	5.5—6.0

Vegetables:

Artichoke (Jerusalem)	6.5—7.5
Leek	6.0—8.0
Asparagus	6.0—8.0
French bean	6.0—7.5
Scarlet runner	6.0—7.5
Brussels sprouts	6.0—7.5
Cabbage	6.0—7.5
Pea	6.0—7.5
Beet	6.0—7.5
Broccoli	6.0—7.0
Lettuce	6.0—7.0
Celery	5.8—7.0
Onion	5.8—7.0
Carrot	5.5—7.0
Cauliflower	5.5—7.5
Cucumber	5.5—7.0
Parsnip	5.5—7.0
Rhubarb	5.5—7.0
Tomato	5.5—7.5
Turnip	5.5—6.8
Parsley	5.0—7.0
Potato	4.8—6.5*

*Maximum 5.4 for scab control.

Flowers:

Plants and shrubs from the flower garden find, in general, the range 6.0—7.5 preferable. The following exceptions may be noted:

Most rhododendrons and azaleas	4.5—6.0
Camellia	4.5—5.5
Heath	5.5—6.0
Hydrangea (blue)	4.0—5.0
(red)	6.0—7.0

Garden sorrel can tolerate a pH as low as 4.0, and hence tends to flourish when very acid conditions are limiting other growth. Its presence, therefore, usually indicates a need for lime.

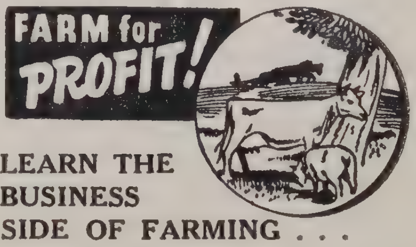
The upper limit in the optimum pH ranges quoted is frequently given as 7.0 or over. Under alkaline conditions there is a danger of rendering iron, manganese, and boron unavailable for plant nutrition. These elements are essential for healthy growth. Some writers in consequence consider that a pH of 6.7 should not be exceeded.

Disease Control

The organism responsible for potato scab is checked at a pH of 4.5, and consequently potatoes grown in a soil of that acidity are immune. Actually it is fairly safe to go as high as 5.4. Though it is not usual to lime before a potato crop, judicious liming of a very acid soil can be beneficial.

The club root organism tolerates acid conditions better than the various brassica crops it attacks, but is inhibited by an alkaline reaction. For control of the disease liberal liming is therefore indicated.

It becomes obvious that potatoes and brassicas cannot be grown in rotation with success if the soil harbours the infections mentioned.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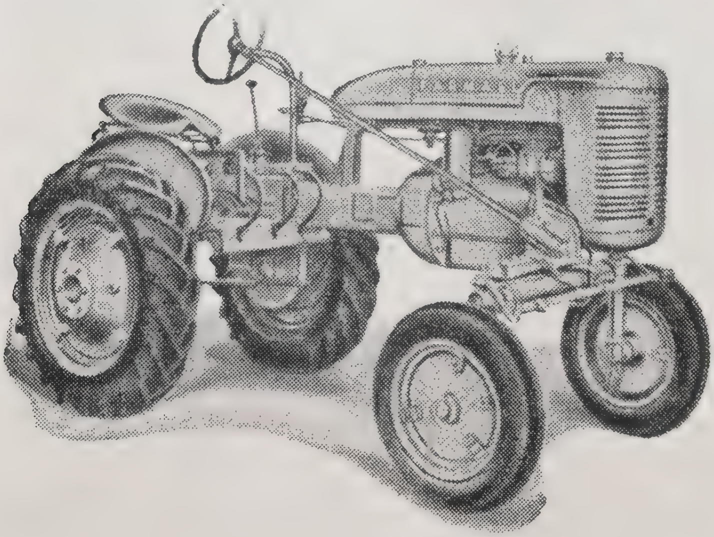

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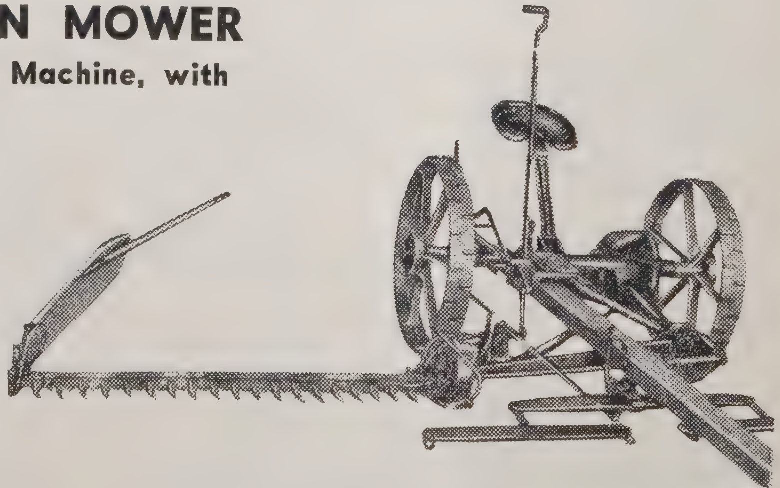

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Reduction of Acidity

One way of regarding lime requirement is now fairly clear. We may define it as that amount of lime necessary to raise the pH of the soil to the level required for optimum growth of whatever crops are contemplated. This can be found by laboratory means fairly accurately, provided the soil sample has been properly taken and is representative of the area concerned. A number of portions of soil are weighed out and treated with varying strengths of limewater for about 18 hours. The end pH is determined in each case. A graph is then drawn relating the various lime dressings with the final pH values reached. In general the desirable pH will be about 6.0. From the graph the lime dressing necessary to adjust the acidity to this value can be read off.

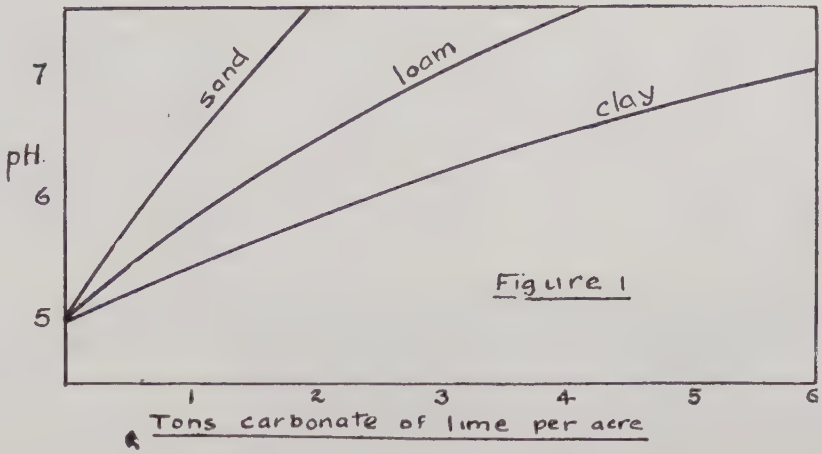
The laboratory result will be expressed as percentage carbonate of lime. The factor necessary to convert this to a tons per acre basis will depend on whether arable land or permanent pasture is concerned, as in the former case a dressing becomes mixed with a greater depth of soil. The factors 10 and 4 respectively have been used assuming 2,000,000lb. of soil per acre of 9in.

CONTRASTS IN LIME ECONOMY.

Lime removals (approximate) expressed as lb. carbonate of lime per acre per annum.

	lb.
Loss in drainage water through leaching	150 — 500
In lamb carcases (allowing 5 carcases of 35lb. dressed weight per acre)	8
In milk (2 acres per cow)	10
In a wheat crop (grain)—32 bushels	2
In oat chaff—3½ tons	50
In lucerne hay—4½ tons	350
In clover hay—2 tons	125
In potatoes—5½ tons	7
Lime content of 1cwt. of super	56
Lime production per acre of sown grassland and cultivated land—(1943):	
North Island	63
South Island	158

The original pH of the soil is a measure of the acid intensity, and shows whether liming is needed. The quantity of lime required, however, as determined above, depends on the amount rather than the intensity of acidity. An acid soil of high base exchange capacity will contain more exchangeable hydrogen (amount of acidity) than an equally acid soil of low base exchange capacity, and hence will need heavier dressings. In Fig. 1 are shown typical graphs for the neutralisation of a clay with a high capacity, a sand with a low base exchange capacity, and a loam in an intermediate position. The initial pH in each case is 5.0.



It will be seen that to raise the sand, loam, and clay from the same initial acidity to a pH of 6 would require ¾, 1¼, and 2½ tons of lime respectively. If a pH of 7 was desired, the several dressings would be 1½, 3, and 6 tons of lime. The effect of liming is, of course, gradual, the rate of action depending on the fineness of grinding, climatic conditions, and so on. The end effect of dressings prescribed by this method will approximate to that aimed at. The pH may be rather lower, more particularly if much lime is lost in the drainage water.

Lime a Plant Food

Liming benefits the soil in many ways. It improves the soil tilth and structure, promoting aeration and drainage; it neutralises undue acidity; it encourages various beneficial micro-organisms and earthworm activity, and finally it is an essential plant food which must be readily available in sufficient amount. A method of estimating lime requirement based on soil acidity has been described. It is now proposed to consider the matter regarding lime as a nutrient rather than a soil conditioner. It is exceedingly difficult to isolate the nutritive and acid-adjusting effects of lime for individual study, but recent work seems to point to the nutritive aspect as being the more fundamental, for certain plants at any rate.

It was explained earlier that the base exchange capacity of a soil was satisfied partly by bases—predominantly lime as a rule—and partly by hydrogen. Experiments have shown that the lime becomes less easily available for plant uptake as the percentage saturation of the soil falls; i.e., as the proportion of soil bases to hydrogen diminishes. It appears that the absolute amount of exchangeable lime in a soil may not be the critical factor; for its availability is dependent on the percentage saturation. The Soil Survey Division has found that for satisfactory lime nutrition a soil should be at least 60 per cent. saturated. If we accept this figure, we have a further method of assessing the lime requirement of a soil. The lime requirement can be defined as that lime addition necessary to raise the base saturation to 60 per cent.

The position will be made clearer from examples. A clay soil and sand of high and low base exchange capacities respectively will be selected.

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In the diagram the two columns represent the base exchange capacities of a clay and a sand respectively, the former being three times as great as the latter. Each soil is 25 per cent. saturated, the diagonal shading indicating the soil bases and the remainder of the column hydrogen. The clay soil contains three times as much lime as the sand, but will not be able to provide a better supply owing to the low saturation. The horizontal shading indicates the amount of lime needed to raise the percentage saturation to 60. It is three times as great in the clay soil as in the sand. Even after the lime dressing the sand will not contain as much exchangeable lime as the untreated clay soil, but it will be a much more available source of lime for plant nutrition.

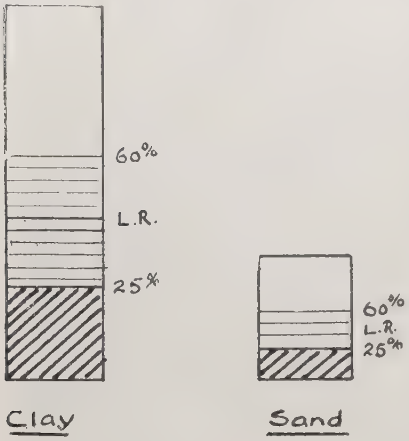

Figure 2

The estimation of lime requirement by this method involves determining the base exchange capacity and also the total exchangeable bases present in the soil. (Lime, magnesium, and potassium are usually estimated individually). The percentage saturation and requisite lime dressing are then readily calculated. The data provide much information in addition to the lime requirement, but a considerable amount of work is entailed. More rapid methods of making the estimations have recently been described. The estimate of the lime requirement of the North Island made by the Soil Survey Division was determined as described.

Where the actual pH value is critical, as with a potato crop, the earlier method would be preferable.

There are many further laboratory methods of determining the lime requirement of soils, depending on a variety of principles. The two described will suffice to show the nature of the problems involved.

Field Estimations

Various field methods of assessing the lime requirement of soils have been devised and will be briefly described, as enquiries concerning their value have been received.

(i) Indicator Methods:
A coloured indicator is used to show the acidity of the soil (pH). It will be clear from the foregoing discussion that such methods may give some idea as to whether liming is necessary, but not the quantity required. An experienced man familiar with the soil types concerned may use data so obtained to good advantage.

(ii) The Truog Test:
The exchangeable hydrogen in a soil is caused, under the conditions of the test, to release a gas which reacts with a strip of impregnated paper to give a stain. The depth of the stain varies according to the amount of exchangeable hydrogen, and hence is indicative of the lime requirement.

(iii) The Comber Test:
In this test the exchangeable iron in acid soils is released and reacts with a chemical to give a red colour. The more acid the soil the more iron goes into solution and the deeper is the coloration. Professor Comber regarded the test as qualitative only, but the University of Illinois, in a field test for farmers, has given it a quantitative interpretation. The test would be misleading on an iron-deficient soil.

The shades or intensities of colour developed in any of these three tests can be correlated with results of field experiments or calibrated against soils of known lime response. The connections noted are likely to apply only to the particular soil type concerned, however. The tests can prove useful in showing where a laboratory examination is called for, and also in revealing variations in acidity over a field.

To Increase Acidity

Sometimes it is desirable to increase artificially the acidity of a soil. On golf greens, for instance, one does not desire a succulent pasture, nor are earthworm casts looked on with favour. At low pH values the more wiry types of grass will dominate and worm activity be inhibited. The change can be brought about by dressing with ammonium sulphate, iron sulphate, or sulphur. In the case of sulphur inoculation with the organism which converts it to sulphuric acid may be required. Soil not acid enough for potato culture may be treated similarly.

However, a soil is far more likely under our climatic conditions to be too acid than to err in the other direction, for lime and other bases are constantly being removed in drainage water. There is also a removal by plant uptake. It can be seen that the lime status of the soil not only may need to be corrected but must also be maintained. Under present conditions it is obvious that only the more urgent needs can be met, but in the post-war years a determined effort must be made to satisfy the lime hunger of our soils.

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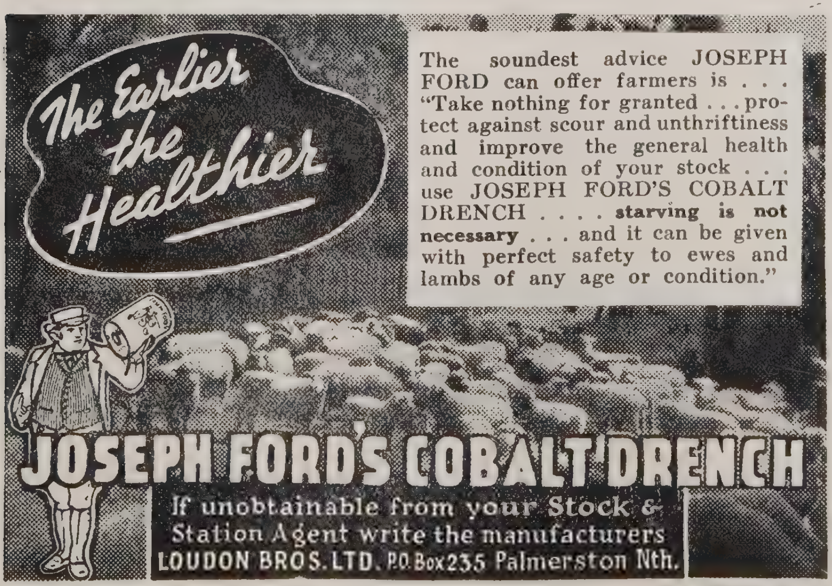
1. "Lime is a Cornerstone of Increased Production," M. M. Burns—"New Zealand Journal of Agriculture," Vol. 61, December, 1940, pp. 405—411.
2. "Soil Reaction (pH) Preferences of Plants," Special Bulletin 306 of the Michigan State College, C. H. Spurway. Data have been taken from this compilation, N.Z. common names being substituted where necessary for the American equivalent.



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Testing of Purebred Dairy Cows

1941-42-43 C.O.R. Summary for Other Breeds

Contributed by the Dairy Division, Wellington

A STATISTICAL survey of Certificate-of-Record testing results for the Jersey breed for the three calendar years 1941, 1942, and 1943 was printed in the November number of the "Journal." In the present number the survey is concluded with a similar summary for the other breeds which participate in the C.O.R. test, namely, the Friesians, Milking Shorthorns, and Ayrshires.

Good performances continue to be recorded from year to year, and while, during the period under review, there have been no changes in the class-leadership records of the Ayrshire and Milking Shorthorn breeds, it is pleasing to be able to draw attention to new leaders in some of the Friesian classes.

1.—YEARLY TEST DIVISION

In the Friesian breed the leader of the junior three-year-olds at the end of 1940 was Monavale Queen Bess, with 800.18lb. butterfat, a record made in 1923. In 1941 Koromiko Buttercup, owned by Mr. M. J. Parker, of Dalefield, became the new leader with 800.53lb. fat. In 1942 Koromiko O.K. Lass, also owned by Mr. Parker, raised the leadership record to 801.17lb. fat. In 1943 Totara Defender Flapper, owned by Mr. E. P. McAnulty, of Eketahuna, assumed the class-leadership with 803.93lb. fat. It is therefore interesting to note that a record which had stood for 17 years was exceeded three years in succession, and that even so the record for the class was raised by only 3.75lb. butterfat.

"Totara Defender Flapper," tested by E. P. McAnulty, Eketahuna, new junior three-year-old Friesian class leader in the yearly division; 803.93lb. fat in 365 days at 3 years 7 days.

The class leaders at the end of 1943 for Friesians in the yearly division of the C.O.R. test are given in Table 12. Table 13 gives the highest Friesian records for the same division of the testing during the calendar year 1943.

TABLE 12

FRIESIAN CLASS LEADERS AS AT 31/12/43.

Yearly (365-Day) Division.

Class.	Name of Cow.	Owner.	Age. yrs.	days	Std.	Days.	Milk	Fat
					lb.		lb.	lb.
Junior two-year-old. ..	Oakview Keyes Trojan	A. W. Montgomerie, Mangere	2	131	288.6	365	22,146.8	836.98
Senior two-year-old ...	Pareora Echo Blossom	T. Sheriff, Clandeboye	2	223	262.8	365	22,671.9	819.81
Junior three-year-old .	Totara Defender Flapper	E. P. McAnulty, Eketahuna	3	7	312.7	365	19,748.0	803.93
Senior three-year-old ..	Totara C.R. Buttercup	Piri Land Co., Auckland	3	247	336.7	365	25,885.3	989.10
Junior four-year-old ..	Totara veeman Lulu	Piri Land Co., Auckland	4	12	349.7	365	22,364.2	946.78
Senior four-year-old ..	Totara C.R. Buttercup	Piri Land Co., Auckland	4	267	375.2	365	27,108.1	1,079.14
Mature	Alcartra Clothilde Pietje	Vernon Marx, Mangatoki	7	355	350.0	365	31,312.5	1,145.24

TABLE 13

FRIESIAN CLASS LEADERS 1943.

Yearly (365-Day) Division.

Class.	Name of Cow.	Owner.	Age. yrs.	days	Std.	Days.	Milk	Fat.
					lb.		lb.	lb.
Junior two-year-old ...	Glenhope C.M. Colantha	C. Humm & Sons, Waikuku	2	25	278.0	351	13,903.2	543.19
Senior two-year-old ..	Sunnybrae Trojan Jessie	Kay Bros., Duvauchelles Bay	2	343	309.8	365	13,608.0	524.75
Junior three-year-old .	Totara Defender Flapper	E. P. McAnulty, Eketahuna	3	7	312.7	365	19,748.0	803.93
Senior three-year-old ..	Dalefield Echo Belle	K. G. Fairbrother, Dalefield	3	364	348.4	360	14,818.3	498.06
Junior four-year-old ..	Turepo R.L. Princess Pearl	J. H. Bartlett, Mangaonoho	4	12	349.7	365	19,117.7	796.61
Senior four-year-old ..	—	—	—		—	—	—	—
Mature	Easdale Domino Sensation	W. N. Taylor, Silverside	5	181	385.0	365	15,892.6	841.51

Friesian Class Averages.

Class averages for the Friesian breed for the calendar years 1941, 1942, and 1943 are shown in Table 14, while Table 15 shows the position from the commencement of the testing in 1912 to the end of each of those three years.

TABLE 14

FRIESIAN CLASS AVERAGES FOR 1943-42-41.

Yearly (365 Day) Division.

Class.	Average Yield for Season.			
	Number of Cows.	Days in Milk.	Milk. lb.	Butterfat lb.
1943—				
Junior two-year-old ..	12	333	11,291.5	416.14
Senior two-year-old ..	3	341	10,714.6	438.61
Junior three-year-old	4	321	13,724.4	539.67
Senior three-year-old .	2	336	13,750.7	466.59
Junior four-year-old .	1	365	19,117.7	796.61
Senior four-year-old ..	—	—	—	—
Mature	5	331	16,547.7	646.80
Total	27	333	13,033.2	497.48
		Average Test: 3.81%		
1942—				
Junior two-year-old ..	17	358	12,609.7	472.15
Senior two-year-old ..	6	332	13,526.8	479.39
Junior three-year-old .	5	347	14,896.3	529.31
Senior three-year-old .	—	—	—	—
Junior four-year-old ..	5	361	16,574.9	594.48
Senior four-year-old ..	6	360	15,705.7	608.12
Mature	14	348	16,204.3	592.68
Total	53	352	14,603.3	537.13
		Average Test: 3.67%		
1941—				
Junior two-year-old ..	19	354	13,849.6	526.31
Senior two-year-old ..	6	360	14,806.8	504.59
Junior three-year-old	4	357	15,144.3	601.70
Senior three-year-old	2	347	14,179.6	478.22
Junior four-year-old ..	3	332	19,244.8	626.45
Senior four-year-old ..	2	365	15,127.5	591.74
Mature	14	341	14,253.1	550.39
Total	50	350	14,569.0	543.18
		Average Test: 3.72%		

TABLE 15

Table showing Averages of all Friesian 1st. Class C.O.R. issued from commencement of C.O.R. Testing to 31/12/43-42-41.

Yearly (365-Day) Division.

Class.	Average Yield for Season.			
	Number of Certificates.	Days in Milk.	Milk. lb.	Butterfat lb.
To end 1943—				
Junior two-year-old ..	790	347	12,116.0	433.24
Senior two-year-old ..	311	348	12,931.2	461.73
Junior three-year-old	223	344	13,666.8	488.74
Senior three-year-old	217	338	14,344.5	515.29
Junior four-year-old ..	162	344	15,479.7	550.32
Senior four-year-old ..	163	347	16,312.5	573.79
Mature	715	344	16,225:5	577.35
Total	2,581	345	14,150.2	504.51
		Average Test: 3.56%		
To end 1942—				
Junior two-year-old ..	778	347	12,128.7	433.51
Senior two-year-old ..	308	348	12,952.8	461.95
Junior three-year-old .	219	344	13,665.8	487.81
Senior three-year-old	215	338	14,350.0	515.75
Junior four-year-old ..	161	344	15,457.1	548.79
Senior four-year-old ..	163	347	16,312.5	573.79
Mature	710	344	16,223.3	576.86
Total	2,554	345	14,162.0	504.59
		Average Test: 3.56%		
To end 1941—				
Junior two-year-old ..	760	347	12,118.8	432.68
Senior two-year-old ..	302	348	12,941.4	461.61
Junior three-year-old	214	344	13,637.0	486.84
Senior three-year-old	215	338	14,350.0	515.75
Junior four-year-old ..	156	343	15,421.3	547.32
Senior four-year-old ..	157	347	16,335.7	572.48
Mature	697	343	16,216.8	576.29
Total	2,501	345	14,152.6	503.90
		Average Test: 3.56%		

Friesian C.O.R. Bulls.

There are now 142 bulls on the Friesian C.O.R. list, that is, bulls with four or more C.O.R. daughters, each from a different dam. In 1941 three new names were added, two

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"Koromiko O.K. Lass," tested by M. J. Parker, Dalefield, junior three-year-old Friesian class leader in the yearly division at the end of 1942; 801.17lb. fat in 365 days at 3 years 161 days.

in 1942, and two in 1943. The 2,157 cows (including 305-day) certificated to the end of 1943 are represented by 810 sires.

Ayrshires and Milking Shorthorns.

There were no changes in class leadership in either the Ayrshire or the Milking Shorthorn classes during the three years under review. A record worthy of special mention is that put up last year by the Milking Shorthorn cow Kereru Gaze, owned by Mr. A. Struthers, of Silverside, Mosgiel. This cow commenced her test at the age of 14 years 1 day, and, having regard to her age, her record of 722.57lb. fat is particularly creditable. She was bred by Mr. W. J. Slack, of Manakau. The class leaders for these breeds as at the end of 1943 are shown in Tables 16 and 17.

TABLE 16

AYRSHIRE CLASS LEADERS AS AT 31/12/43.

Yearly (365 Day) Division.

Class & Name of Cow.	Tested by.	Age yrs. dys.	Yield for Season. Std.	Dys.	Milk.	Butter-fat.
			lb.		lb.	lb.
2-year-old Fair Maid of Greenbush	W. Moore, Homebush	2 27	243.2	365	12,281.3	673.56
3-year-old Maesgwyn Victoria	C. M. Williams, Kaiapoi	3 250	302.5	365	16,507.7	646.98
4-year-old Ivanhoe Fancy	A. M. Weir, Menzies Ferry	4 308	344.3	365	14,207.7	713.93
Mature Floss of Braeside	W. Moore, Homebush	7 287	350.0	365	20,305.5	832.72

Tables 18, 19, 20, and 21 provide a numerical and production summary of the position of the Ayrshire and Milking Shorthorn breeds, class by class, for the three years under review, and from the commencement of the testing to the end of each of the three years under review.

TABLE 18

AYRSHIRE CLASS AVERAGES, 1942-41.

Yearly Division.

Class.	Cows.	Average Yield for Season. Days in Milk.	Milk.	Fat.
1942—			lb.	lb.
Two-year-old	1	317	8,088.3	335.86
Three-year-old	1	277	9,327.7	384.01
Four-year-old	—	—	—	—
Mature	1	365	14,058.1	574.67
Total	3	319	10,491.3	431.51
		Average test: 4.11%		
1941—				
Two-year-old	1	365	10,487.2	432.28
Three-year-old	1	249	10,513.6	411.96
Four-year-old	—	—	—	—
Mature	2	330	12,334.3	501.74
Total	4	318	11,417.3	461.93
		Average test: 4.04%		

"Koromiko Buttercup," tested by M. J. Parker, Dalefield, junior three-year-old Friesian class leader in the yearly division at the end of 1941; 800.53lb. fat in 365 days at 3 years.

TABLE 17

MILKING SHORTHORN CLASS LEADERS AS 31/12/43.

Yearly (365 Day) Division.

Class.	Name of Cow.	Tested by.	Age at Start of Test. Yrs. Dys.	Std. lb.	Yield for Season. Days.	Milk. lb.	Butter-fat. lb.
Junior two-year-old ..	Matangi Quality 4th.	Ranstead Bros., Matangi	2 109	251.4	365	14,572.8	591.89
Senior two-year-old ..	Pinedale Beauty 4th.	G. D. Hall & Son, Otorohanga	2 362	311.7	365	13,273.0	580.62
Junior three-year-old ..	Matangi Quality 4th.	Ranstead Bros., Matangi	3 153	292.3	365	16,281.4	678.02
Senior three-year-old .	Matangi Ruth 2nd.	Ranstead Bros., Matangi	3 304	307.4	365	14,032.7	747.86
Junior four-year-old ..	Matangi Matilda 4th.	Hon. Mrs. C. J. Blyth, Kohimarama	4 —	313.5	358	14,640.2	630.38
Senior four-year-old ..	Ashley Bank Winsome	Peach Bros., Sefton	4 298	378.3	365	17,687.7	730.93
Mature	Glenthorpe Lady	A. J. Melville, Buckland	Mature	350.0	365	20,136.2	856.85

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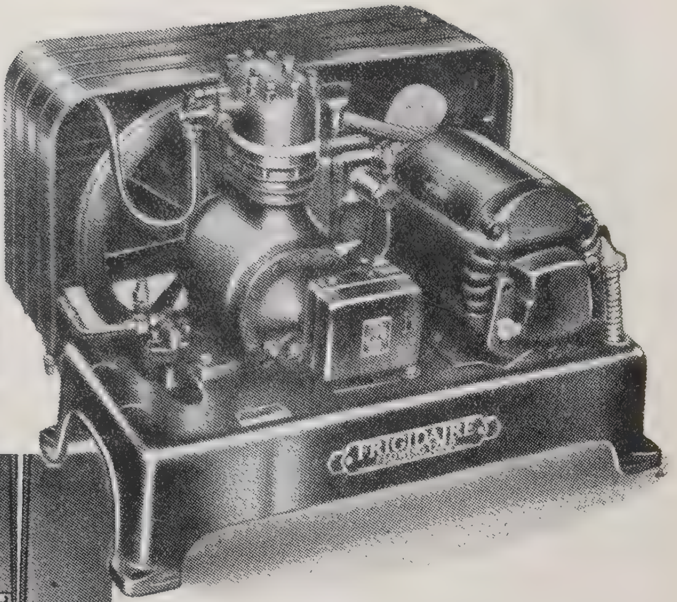

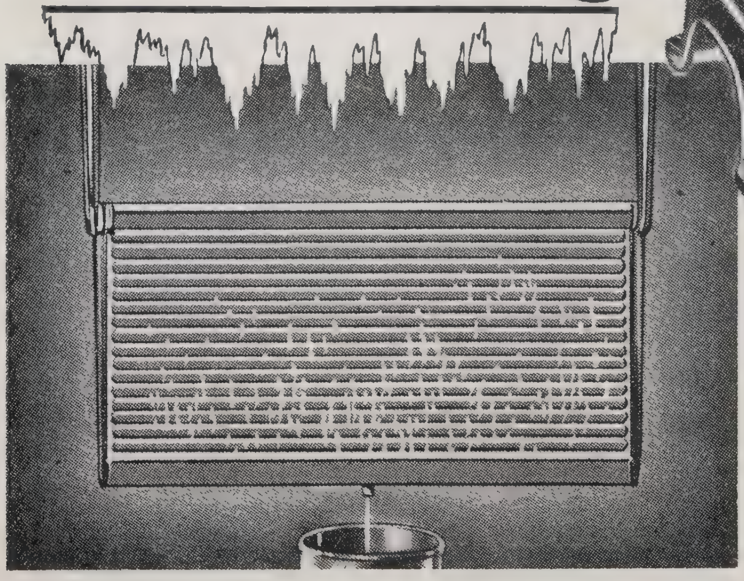

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"Springvale Echo Annabella Jewel," tested by C. Humm & Sons, Waikuku, senior three-year-old Friesian class leader in the 305-day division at end of 1942; 553.82lb. fat in 305 days at 3 years 252 days.

TABLE 19

Table showing averages of all Ayrshire 1st. Class C.O.R. issued from commencement of C.O.R. testing to 31/12/42-41.

Yearly Division.

Class	Certificates	Average Yield for Season.		
		Days in Milk.	Milk.	Fat.
1942—			lb.	lb.
Two-year-old ...	78	344	9,052.1	375.63
Three-year-old ..	43	343	10,102.9	415.55
Four-year-old ...	27	346	11,378.0	459.52
Mature	114	348	11,940.8	486.33
Total	262	346	10,721.2	438.99
		Average test: 4.09%		
1941—				
Two-year-old ...	77	344	9,064.6	376.15
Three-year-old ..	42	345	10,121.4	416.30
Four-year-old ...	27	346	11,378.0	459.52
Mature	113	348	11,922.1	485.55
Total	259	346	10,723.8	439.08
		Average test: 4.09%		

"Okains Nickel," tested by R. G. McIntosh, Paeroa, new senior two-year-old Friesian class leader in the 305-day division; 500.38lb. fat in 305 days at 2 years 349 days; also new senior three-year-old class leader in the 305-day division; 592.76lb. fat in 305 days at 3 years 335 days.

TABLE 20

MILKING SHORTHORN CLASS AVERAGES

1943-42-41.

Yearly (365-Day) Division.

Class.	Cows.	Average Yield for Season.		
		Days in milk.	Milk.	Fat.
1943—			lb.	lb.
Junior two-year-old ..	—	—	—	—
Senior two-year-old ..	—	—	—	—
Junior three-year-old	—	—	—	—
Senior three-year-old	—	—	—	—
Junior four-year-old .	1	365	10,354.3	354.54
Senior four-year-old .	1	296	9,074.5	451.68
Mature	1	365	14,408.8	722.97
Total	3	342	11,279.2	509.59
		Average test: 4.51%		
1942—				
Junior two-year-old ..	—	—	—	—
Senior two-year-old ..	2	365	11,674.3	506.71
Junior three-year-old	—	—	—	—
Senior three-year-old ..	2	364	10,096 9	447.22
Junior four-year-old	—	—	—	—
Senior four-year-old	—	—	—	—
Mature	1	291	9,741.0	395.19
Total	5	350	10,656.6	460.61
		Average test: 4.32%		
1941—				
Junior two-year-old ..	4	337	7,767.4	341.84
Senior two-year-old .	1	335	8,335 6	417.23
Junior three-year-old	1	331	9,113.1	430.56
Senior three-year-old	2	354	10,563.5	421.91
Junior four-year-old	1	365	12,039.0	515.90
Senior four-year-old	1	365	11,820.9	536.13
Mature	1	365	11,315.9	490.27
Total	11	347	9,529.2	418.29
		Average test: 4.38%		

TABLE 21

Table showing Averages of all Milking Shorthorn 1st. Class C.O.R. issued from commencement of C.O.R. Testing to 31/12/43-42-41.

Yearly (365-Day) Division.

Class.	Certificates.	Average Yield for Season.		
		Days in Milk.	Milk. lb.	Fat. lb.
1943—				
Junior two-year-old	67	349	8,492.4	351.85
Senior two-year-old	50	351	9,108.0	382.00
Junior three-year-old	31	337	9,751.1	401.94
Senior three-year-old	41	344	10,916.1	451.97
Junior four-year-old	30	351	11,200.6	459.94
Senior four-year-old	42	347	11,565.2	443.72
Mature	311	342	11,898.8	478.27
Total	572	344	11,007.9	445.52
		Average test: 4.04%		
1942—				
Junior two-year-old	67	349	8,492.4	351.85
Senior two-year-old	50	351	9,108.0	382.00
Junior three-year-old	31	337	9,751.1	401.94
Senior three-year-old	41	344	10,916.1	451.97
Junior four-year-old	29	350	11,229.8	463.57
Senior four-year-old	41	343	11,626.0	443.53
Mature	310	342	11,890.7	477.48
Total	569	344	11,006.5	445.19
		Average test: 4.04%		
1941—				
Junior two-year-old	67	349	8,492.4	351.85
Senior two-year-old	48	350	9,001.1	376.80
Junior three-year-old	31	337	9,751.1	401.94
Senior three-year-old	39	343	10,958.2	452.21
Junior four-year-old	29	350	11,229.8	463.57
Senior four-year-old	41	343	11,626.0	443.53
Mature	309	342	11,897.7	477.74
Total	564	344	11,009.6	445.05
		Average test: 4.04%		

Ayrshire and Milking Shorthorn Bulls.

At the end of 1943 Ayrshire C.O.R. bulls numbered 13, and the total bulls of the breed 144. The corresponding figures for Milking Shorthorns are 19 and 198 respectively.

2.—305-DAY TEST DIVISION

Changes in class leaderships of the Friesian breed have taken place in four classes of the 305-day division. At the end of 1940 the record for the junior two-year-olds was held by Mr. H. G. A. Cameron's Sealands Magpie Pietertje, with 454.16lb. fat. In 1941 this was raised to 457.82lb. by Millslea Princess Taureau, owned by Mr. W. C. Miller, of Motukarara, and in 1943 to 466.65lb. fat by the same owner's Millslea Katrina Tui.

In 1941 in the senior two-year-old class Rosevale Beauty Posch Griselda (468.50lb. fat), tested by Mr. E. H. Watson, of Windsor, was displaced by Okains Nickel (500.38lb. fat), owned by Mr. R. G. McIntosh, of Paeroa. That Okains Nickel is an outstanding cow is evidenced by the fact that in 1943, as a senior three-year-old, with 592.76lb. fat, she took the leadership of the class from Messrs. C. Humm and Sons' Springvale Echo Annabella Jewel (553.82lb. fat), the previous leader being Paepaetahi Jewel (529.94lb. fat), tested by Mr. A. F. Perkins, of Taradale.

The final change came in the junior four-year-olds, in which in 1942 Mr. H. Jarden's Fairburn Princess Pauline, with 395.68lb. fat, gave way to Millslea Duchess Taureau, with 497.54lb. fat, owned by Mr. W. C. Miller, of Motukarara. It will thus be noted that Mr. Miller has the creditable distinction of having tested three class leaders in three years.

There were no changes in the Milking Shorthorn or Ayrshire class leaderships for the 305-day division, and the previous tables for these breeds are therefore repeated for record purposes.

TABLE 22

AYRSHIRE CLASS LEADERS AS AT 31/12/43.

305-Day Division.

Class and Name of Cow.	Tested by.	Age. yrs.	dys.	Std. lb.	Dys	Milk. lb.	Butter-fat.
Two-year-old							
Dominion Margaret Rose	Ruakura Farm, Hamilton	1	358	250.0	305	7,461.5	305.95
Three-year-old							
Dominion Marilyn*	Ruakura Farm, Hamilton	3	332	320.2	291	8,552.2	323.59
Four-year-old							
Thirdpart Ha Desert Gold*	H. J. Kelliher, Auckland	4	56	329.1	274	8,548.3	342.96
Mature							
Greenfields Regina 2nd.*	C. E. C. Webb, Levin	9	—	360.0	289	9,829.8	479.66

* Only entry in this class.

SECOND-CLASS CERTIFICATES ISSUED

Second-class certificates in the yearly division were issued to 236 cows during the three years under review. Of these 198 were issued to Jerseys, 36 to Friesians, and 2 to Milking Shorthorns. No Ayrshires were issued with second-class certificates. Grouping the cows of each breed into one class the 198 Jerseys averaged 519.62lb. fat; the 36 Friesians 587.88lb. fat, and the two Milking Shorthorns 674.98lb. fat.

No "ersatz" Ganes

Hitler's war plans involved the use of many "ersatz" or substitute materials. Now, his "victories" are ersatz, too. On our side, *real* victories have resulted in improved supplies and have made possible the

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And speaking of substitutes, Gane has never made use of "ersatz" materials. Throughout the long period of wartime shortages nothing but the best of metals and craftsmanship went into Gane Milking Machines. Thus, the Gane you can now once again buy, measures up to the same superlative standard of quality that has made Gane the wise farmer's choice for the past 35 years.

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TABLE 23

MILKING SHORTHORN CLASS LEADERS AS AT 31/12/43.

305-Day Division.

Class.	Name of Cow.	Tested by.	Age at Start of Test. Yrs.	Age at Start of Test. Dys.	Std. lb.	Yield for Season Days.	Yield for Season Milk. lb.	Yield for Season Butter-fat. lb.
Junior two-year-old ..	No entries	—	—		—	—	—	—
Senior two-year-old ..	Wilford Grove Beulah	Miss R. Arnold, Waimea W.	2	322	282.7	305	8,969.9	451.38
Junior three-year-old	Pinedale Rona	G. D. Hall, Otorohanga	3	35	290.5	305	8,862.4	416.51
Senior three-year-old	Haeremai Sweet Pea	G H. B. Lill, Willowby	3	349	321.9	305	9,368.4	438.49
Junior four-year-old	*Haeremai Snowy 4th.	G H. B. Lill, Willowby	4	18	325.3	305	11,953.3	600.56
Senior four-year-old	Wilford Grove Josette	Miss R. Arnold, Waimea W.	4	345	358.0	297	10,521.9	396.31
Mature	Waimea Fay	H. C. Schroder, Richmond	7	73	360.0	305	14,365.5	539.90

* Only entry in this class.

In the 305-day division for the three years second-class certificates were issued to 44 cows. Of these 40 were issued to Jerseys, 1 to a Friesian, and 3 to Milking Shorthorns. There were no Ayrshires certificated in this division. Grouping the cows of each breed into one class the 40 Jerseys averaged 404.99lb. fat; the 3 Milking Shorthorns 427.65lb. fat, while the 1 Friesian was granted certificate for 380.43lb. fat.

C.O.R. 305-DAY DIVISION

Friesian Class Averages.

Twenty-four Friesians gained certificates in the 305-day division during the three years under review. In 1941 the nine cows certificated averaged 455.48lb. fat; in 1942 eight cows averaged 461.65lb., while in 1943 the seven cows tested averaged 439.16lb. fat.

The average production, class by class, of all Friesians issued certificates since the 305-day test was introduced in 1930 is given in Table 24.

"Greenbank Julia," tested by Est. W. Moore & Son, Masterton, highest Ayrshire cow in 1942; 574.67lb. fat in 365 days at 5 years 85 days.

[*"Straight Furrow" photo.*

SUBSCRIPTION RATES.

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TABLE 24

Table showing averages of all Friesian 1st. Class C.O.R. issued from commencement of C.O.R. Testing to 31/12/43-42-41.

305-Day Division.

Class.	Number of Certificates.	Average Yield for Season. Days in Milk.	Average Yield for Season. Milk. lb.	Average Yield for Season. Fat. lb.
To end 1943—				
Junior two-year-old	32	298	10,553.8	380.80
Senior two-year-old	7	305	11,188.3	391.47
Junior three-year-old	5	300	11,737.7	456.08
Senior three-year-old	6	305	13,554.8	473.35
Junior four-year-old	3	291	12,228.8	425.72
Senior four-year-old	2	305	15,079.0	574.94
Mature	25	294	13,684.2	506.43
Total	80	297	12,062.6	439.18
		Average test: 3.64%		
To end 1942—				
Junior two-year-old	28	297	10,327.9	378.00
Senior two-year-old	7	305	11,188.2	391.47
Junior three-year-old	5	300	11,737.7	456.08
Senior three-year-old	5	305	12,272.1	449.47
Junior four-year-old	3	291	12,228.8	425.72
Senior four-year-old	2	305	15,079.0	574.94
Mature	23	293	13,765.0	512.21
Total	73	297	11,931.4	439.18
		Average test: 3.68%		
To end 1941—				
Junior two-year-old	26	297	10,269.2	378.79
Senior two-year-old	7	305	11,188.2	391.47
Junior three-year-old	5	300	11,737.7	456.08
Senior three-year-old	4	305	11,502.4	423.39
Junior four-year-old	2	284	11,327.8	389.81
Senior four-year-old	2	305	15,079.0	574.94
Mature	19	296	14,119.5	519.71
Total	65	298	11,863.1	436.41
		Average test: 3.67%		

"Kereru Gaze," tested by A. Struthers, Mosgiel, highest Milking Shorthorn cow in 1943; 722.57lb. fat in 365 days at 14 years 1 day.

* In a field of 27 entries in the Four Tooth Ram Class at the Canterbury Show the preceding November these Bushey Park Corriedales secured 1st, 2nd and 3rd.

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1st. PRIZE
CANTERBURY SHOW
2nd. PRIZE
CANTERBURY SHOW

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- Death Rate under 1 per cent

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June 10th, 1942.

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Last autumn on account of a dry season and an indifferent turnip crop I found it would be necessary to hand feed 800 ewe hoggets. They soon learned to feed and were given 3 sacks of sheaf chaff and 1 Bag Cake Nuts per day.

This worked out at about ¾lb chaff and 2oz. Moose per day and was provided for 3 months. They did well and came to shearing in great order.

The death rate was under 1% which speaks for itself.

Yours faithfully, Alesc Twaddle
Manager, Bushey Park Estate.

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Before a crop is fit for combine harvesting it must be ripe enough for threshing; this is usually 7-10 days after it would be considered fit to cut with a binder.

Power Requirements

The table below gives some idea of the size of tractor needed to operate any particular size of combine. The power required varies with the nature of the land and the weight of crop being harvested. Naturally, on hilly land and in heavy crops more power will be required than on level land and in light crops. The figures given are for average conditions.

Width of Cut of Combine.	Draw-bar Horse-Power of Tractor. Power Take-off.	Engine-Driven.
5ft.	16	12
6ft.	18	14
8ft.	24	18
10ft.	—	24
12ft.	—	24

In ordinary circumstances a light tractor should handle a power take-off combine up to 5ft. cut, or an engine-driven one up to 8ft. cut. Larger machines need a higher-powered wheeled tractor or a medium track-layer. It should be remembered, however, that it is an advantage to have a reserve of power when using a power take-off combine; this ensures that there is no reduction in drum speed through thick, damp, or green patches in the crop and avoids drum blockages. Whenever possible the tractor for use with such machines should have a low first gear to enable a heavy crop of straw to be dealt with satisfactorily.

BEFORE WORK.

Before the start of harvest a combine should be checked over in good time to see that it is in perfect working order. Clean out the whole machine thoroughly, removing any straw or rubbish that may have accumulated during storage or transit. Grease round thoroughly, and fill all oil baths to the proper level, using in each case the grade of lubricant advised in the instruction book. With a new machine make use of this opportunity of learning where all the grease nipples are fitted.

Assembling

Put a knife in the cutter bar and see that it beds down correctly over its whole length, tapping down the clips if necessary. Make sure the knife runs freely and go over it and the spare one to see that they are in good order and that all rivets are tight. Turn by hand the drum, elevators, fan, shakers, and all other moving parts to ensure that they are running freely. Fit all belts and chains on the appropriate pulleys and sprockets and see that they are in line and running the right way round; adjust chains, belts, elevators, and canvases to the correct tension. If the combine has pneumatic tyres, inflate them to the pressures specified in the instruction book.

Drawbar and Power Take-off

It is extremely important that a combine is worked with the drawbar at the correct height above the ground, this figure is given in all instruction books. On level ground couple the machine to the tractor that is going to pull it, and adjust the drawbar until the correct height is reached. At the same time the power take-off shaft should be coupled up, and the tractor turned at full lock in both directions to make sure that the shaft does not bind on corners. The power shaft should be arranged in a straight line, as nearly parallel as possible to the direction of travel of the outfit. **All guards must be fitted.**

Testing

With an engine-driven combine check the plugs, magneto points, fan belt tension, filters, and the air cleaner, sump, and radiator to see that they are filled to the correct levels. Before starting the combine or setting the power take-off shaft in motion see that no tools or loose parts have been left anywhere in the machine. The combine should now be started and run at about half speed for a short time. The operator should go round it carefully, listening for unusual noises, and seeing that all parts are running smoothly. After about five minutes the combine should be stopped and examined for warm bearings or other troubles. If everything is normal, give it a final run for a few minutes at full speed. Finally, look over the whole machine for loose nuts, and repeat this at least once in every working day.

Before starting on a particular crop the sieves, drum speed, concave clearance, and air blast should be set according to the maker's instructions, given in the instruction book, for that particular crop. These settings may not be correct for every district and must be modified if necessary in the light of the operator's experience as harvesting proceeds.

DURING WORK.

Opening out may be done by cutting two or three rounds with a binder and putting the sheaves through the combine afterwards. It is, however, quicker, cheaper, and quite as efficient

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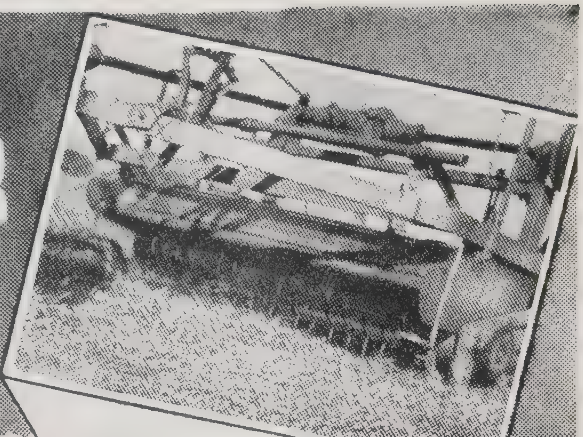

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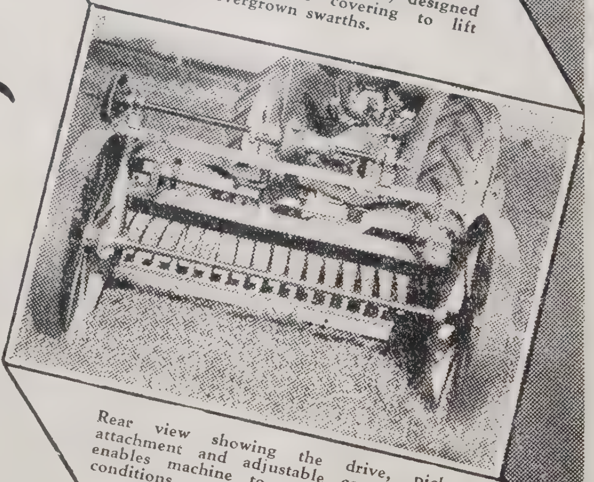

Rear view showing the drive, pick-up attachment and adjustable covering. This enables machine to operate under windy conditions.

Rear view showing machine in operation picking up swarths and placing it on top of overgrowth, thus allowing instant drying and conditioning for harvesting or baling.

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J.A. 15/12/44

to open out with the combine itself, taking a first round with the cutter-bar towards the hedge. Self-propelling combines cut straight into the field; the first cut should be made with the grain delivery spout towards the inside of the field to avoid damage from trees or hedges. Afterwards work always with the delivery spout outwards.

Operating Speeds

A revolution counter for checking the speeds of the power take-off, drum, etc., is essential for the proper operation of a combine.

If a combine is to work efficiently, the knife, canvases, drum, fan, shakers, etc., must always run at their correct speeds, regardless of the speed of travel of the outfit over the ground. With a power take-off combine this means that the governor of the tractor engine must always be set so that the power take-off runs at the rated speed of about 530 r.p.m., and that the tractor must **never be throttled down while the combine is in work.** If it is necessary to change the speed of travel, that is, to reduce or increase the bulk of material passing through the machine, **this must be done by changing gear and not by varying the engine speed.**

The power take-off speed should be checked and the governor control adjusted when the combine is in work, because, with the same governor setting, the speed under load may be rather less than the speed running light. The actual power take-off speed for which the combine has been designed will generally be stated in the instruction book. If it is not, the speed already mentioned (530 r.p.m.) will be near enough.

With an engine-driven combine the speed of the mechanism depends only on the governor of the combine engine, and if this is set correctly the governor-control of the tractor can in this case be adjusted to give any required speed of travel.

Drum Speed and Concave

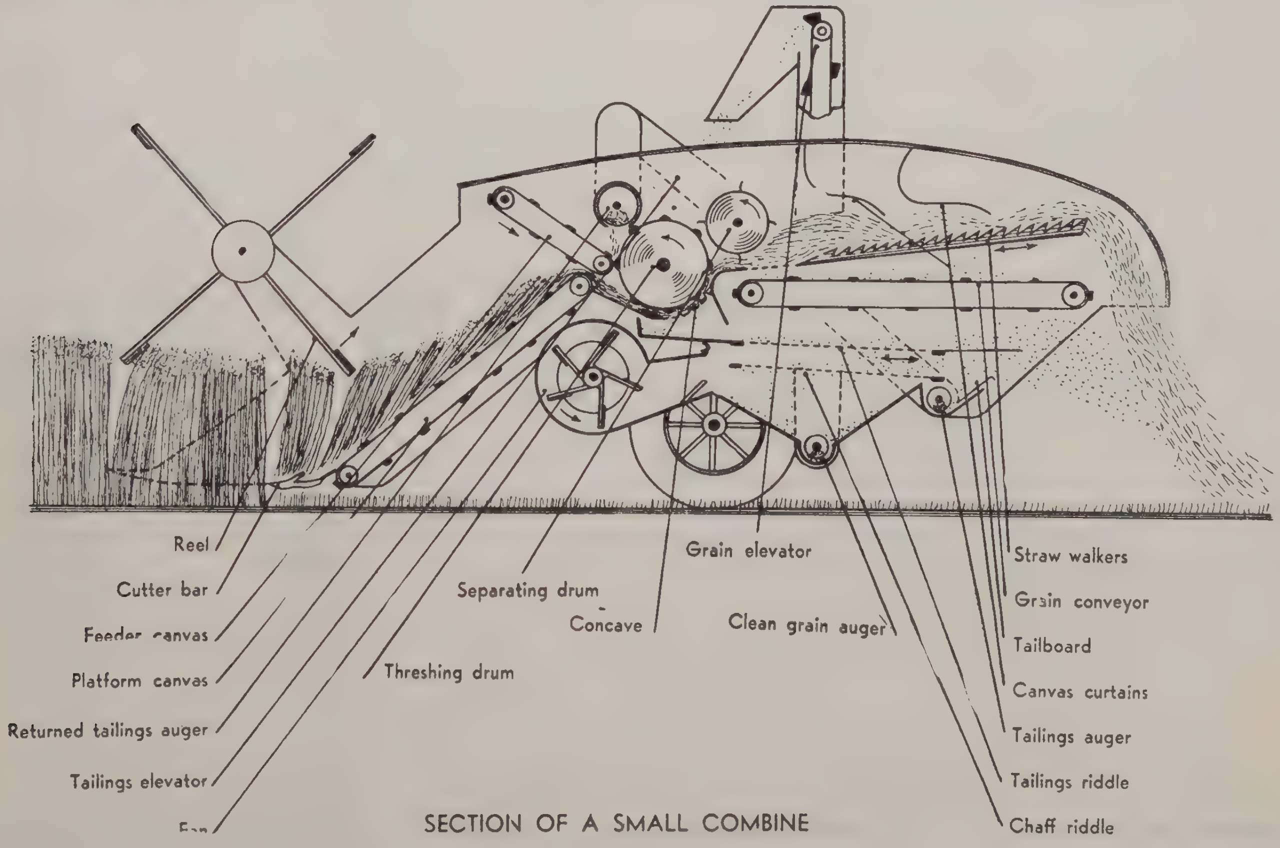
All combines have an adjustment for varying the drum speed in relation to the speed of the rest of the mechanism, because different crops need different drum speeds. The instruction book will give the best average drum speed for any particular crop; and this speed should be used until actual experience in the field shows that it needs to be altered. Too low a speed gives unthreshed ears; too high a speed results in broken grain. When the straw is damp the drum generally needs to run faster than when the straw is dry. Linseed and clover need a higher drum speed than grain crops.

There is always a means of adjusting the clearance between concave and drum. The clearance should be adjusted to give clean threshing without cracking grain, and should be exactly the same at both sides of the drum.

When adjusting the speed of the drum and the clearance of the concave the operator should bear in mind that a higher drum speed and wider concave clearance will always give better threshing and greater freedom from troubles than a lower drum speed and narrower concave clearance.

Fan and Sieves

The fan usually runs at a constant speed, but the blast can be varied by adjusting the shutter over the fan inlet. It should be adjusted so that chaff and grain are completely separated, without grain being blown over the tailboard. Too much blast will blow grain over with the chaff; too little will result in a blocked sieve. The best results will be obtained in normal running when the last quarter of the sieve is kept clear. In order to attain this the fan blast must be varied in conjunction with the sieve opening. Greater efficiency will result from using a relatively strong blast with a larger sieve opening, rather than a weak blast and smaller sieve opening.



SECTION OF A SMALL COMBINE

Safety Clutches

A combine usually has several safety clutches, for example, in the main or power take-off drive and in the elevator drive, etc. When a safety clutch slips in work do not tighten it before finding out what made it slip. The cause will usually be a blockage in some part of the machine. **The tension of a safety clutch should be increased only when it is quite certain that this is necessary for normal work; and even then only a slight adjustment should be made.**

Cutting

On small combines the height of the cutter bar can be controlled from the tractor; on larger models it is controlled from the combine. Combines can cut to within an inch or so of the ground if necessary, provided the straw does not exceed 3ft. in height; but the extra straw passing through the machine slows down the rate of working, and, if damp, may increase the moisture content of the grain. To maintain a good working speed it is therefore advisable to leave as long a stubble as possible, provided it does not interfere with subsequent cultivation of the field and the resulting loss of straw is not important. In leaving a long stubble green material or damp straw is avoided and the maximum rate of working with the minimum grain loss is obtained. The cutter bar should never be set so low that there is a risk of picking up stones which will damage the drum.

The height of the reel on some combines can be adjusted while the machine is at work. The adjustment is not so important with a combine as with a binder, but its careful use will go a long way towards maintaining an even flow of the crop through the machine.

The full width of the cutter bar should be taken whenever possible. If a narrower cut is made, there is the possibility that the short lengths of stubble cut on the overlap will block the sieves. This, naturally, will spoil the sample, and reduce the rate of working.

The aim in combine harvesting should be to work with the maximum overall efficiency; that is, to work at the maximum speed without losing grain in the process. Too much close attention to the grain sample or the length of stubble will impair the rate of working and cause loss of grain. It is much more satisfactory to clean the sample at, or after, the drier, than to attempt to make the combine do it.

Stoppages

Whenever possible run the whole combine empty before stopping. If it is necessary to stop with the drum and platform loaded with corn, clear them by hand before re-starting. Back the machine carefully through a short distance before re-starting so that full drum speed is obtained before the crop is re-entered.

Lubrication

When the combine is at work grease all round at least twice a day, and lubricate fast-moving parts every two or three working hours. Give the combine engine as careful treatment as you would give a tractor engine. Keep radiator and sump properly filled; use the correct grade of oil and change it at the intervals given in the instruction book; keep an eye on the oil pressure. Give special attention to the air cleaner because combining is dusty work.

Storage

Because of its high first cost and short working season, depreciation on

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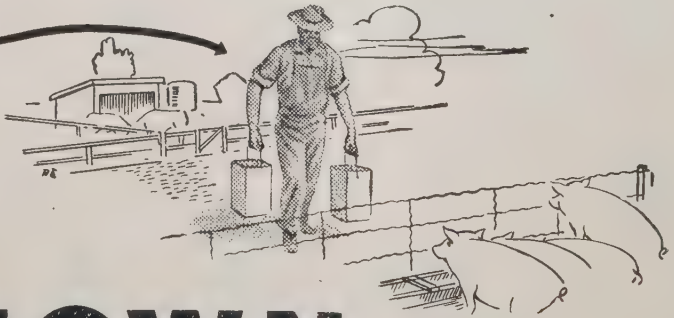

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a combine harvester will be very high unless care is used in storage. The combine should be housed in a weather-proof building, where it is easily accessible and can be looked over from time to time.

Before it is finally packed away at the end of the season the following points should receive attention:—

Chains should be removed, washed in paraffin, dried, and stored in waste oil.

Belts should be removed, cleaned carefully with a blunt knife, and stored in a cool, dry place—preferably away from the light.

Canvases should be taken off, looked over, and repaired if necessary, and stored in a dry place where mice or rats cannot reach them.

Bright parts such as the cutter bar, knives, and pulley faces should be covered with thick grease to prevent rusting.

Knives should be greased thoroughly, and packed away safely.

The whole machine should be cleaned thoroughly inside and out and new grease forced into every bearing. Note should be made of any new parts needed for the next season; they should be ordered promptly and fitted as soon as they arrive. Pneumatic-tyred machines should be jacked up with the wheels clear of the ground, and the tyres protected from the sun and weather.

Engine. Give special attention to the combine engine. Clean and grease it thoroughly; change the oil, fit a new oil filter, and run the engine for a few minutes to get the new oil circulated. Drain the radiator and cooling system; and drain all the fuel from tanks, float chambers, and fuel lines. Remove the sparking plugs and pour half a cupful of lubricating oil into each cylinder. Crank the engine to distribute the oil over the cylinder walls and replace the sparking plugs. If there is a battery, remove it and keep it fully charged and topped-up. Remove the magneto and store in a warm cupboard indoors.

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THRESHING TROUBLES

The following table gives typical threshing troubles on combines, and their usual causes:—

TROUBLE.	CAUSE.
Unthreshed heads in the straw.	Drum speed too low. Concave clearance too great. Beater bars and/or concave badly worn.
Threshed grain in the straw.	Too much straw passing through machine. Speed of travel too high.
Cracked grain.	Drum speed too high. Concave set too close to drum. Too much tailings returned to drum.
Badly broken straw.	Concave set too close to drum.
Chaff in grain.	Too little blast from fan.
Grain blowing over with chaff.	Too much blast from fan. Insufficient opening of chaffer sieve. Tailboard set too low.
Grain riding over sieves.	Too little blast from fan. Speed of travel too high. Speed of combine mechanism too low. Insufficient opening of chaffer sieve. Excessive green material being cut with the crop. Too much slope on the sieves (for example, when cutting uphill).
Straw wrapping round drum.	Drum speed too low. Concave set too close to drum. Cutting too much straw. Straw too green or too damp.

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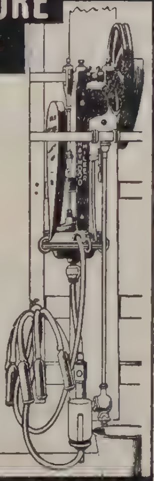

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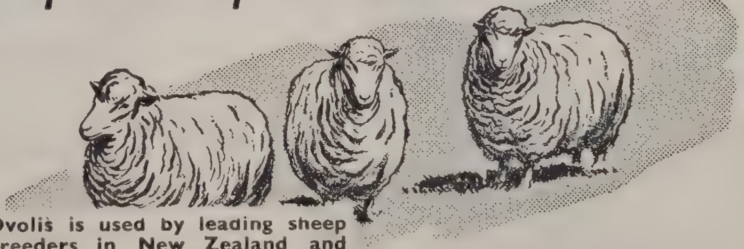

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Grading of Export Butter and Cheese

Leading Dairy Factory Averages for Year Ended July 31, 1944

Contributed by the DAIRY DIVISION.

BUTTER-MANUFACTURING companies which have obtained an average grade of 94 points or over and cheese-manufacturing companies which have obtained an average grade of 93 points or over are listed below.

Of the total 159 creameries or dual plant factories manufacturing butter for export, 20 are included in the list as compared with 19 for the previous year, and of the 277 cheese factories and dual plant factories manufacturing cheese for export, 22 as compared with 14 for the previous year have averaged 93 points or over.

Of the total factories, 14 butter and 14 cheese factories are situated in the North Island and 6 butter and 8 cheese factories in the South Island.

Company	Regd. No.	Brand.	Tonnage Graded.	Ave. Grade.
		CREAMERY BUTTER.		Points.
Westland	145	Westland	131	94.607
United	1,296	Whariti	152	94.414
Kaikoura	302	Kai	111	94.412
Rangitikei	1,360	Rangitikei	409	94.409
Murchison	1,888	Airship	109	94.368
Levin	910	Lake	382	94.273
Konini	1,203	Konini	376	94.194
Wairoa	1,345	Wairoa	117	94.181
Tolaga	1,007	Tolaga Bay	198	94.169
Ruawai	66	Ruawai	1,052	94.163
Kia Ora	926	Kia Ora	858	94.148
Rangiwahia-Ruahine	750	Quail	26	94.144
Rata	938	Rata	429	94.137
Inter-Wanganui	6	Inter-Wanganui	87	94.134
Golden Bay	146	Sovereign	540	94.109
Karamea	1,570	Karamea	85	94.098
Awahuri	664	Red Rose	155	94.087
Matakana	1,375	Matakana	489	94.068
Okitu	1,270	Okitu	137	94.013
Maungaturoto	1,407	Otamatea	1,350	94.002
		CHEESE.		Points.
Pahiatua	140	Pahiatua	85	93.565
Opouriao	1,169	Opouriao	293	93.520
Stirling	292	Stirling	159	93.446
Tuturau	132	Tuturau	53	93.382
Cloverlea	64	Cloverlea	115	93.379
Orari	254	Orari	205	93.350
Okain's Bay	239	Okain's Bay	173	93.319
North Taranaki	723	Flax	125	93.285
Waiohiki	1,681	Waiohiki	44	93.271
Greytown-Wairarapa	529	Greytown	678	93.251
Ryal Bush	477	Ryal Bush	206	93.246
Featherston	360	Featherston	429	93.221
Bidwill	270	Bidwill	289	93.209
Bell Block	488	Bell Block	364	93.187
North Taranaki	212	Waipapa	400	93.187
Patua	73	Patua	503	93.133
Little Akaloa	32	Little Akaloa	51	93.089
Bruntwood	1,534	Bruntwood	694	93.057
Kahui	493	Kahui	219	93.047
Joll, T. L.	1,723	Maori Chief	382	93.036
Pembroke	234	Pembroke	439	93.013
Barry's Bay	401	Onawe	249	93.001

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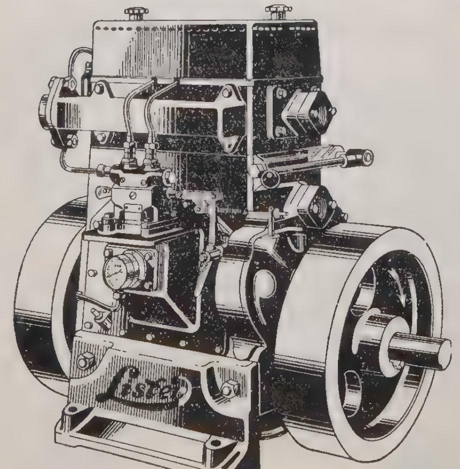

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FARMING IN NEW ZEALAND

Crop production

TO supplement pasture production during periods of minimum growth in the summer and winter and to provide necessary food and fibre crops the Dominion produces 1⅓ million acres of annual crops—about half being cereals and half root and green fodder crops.

By
J. A. S. MILLER,
Assistant Seed Certification Officer, Wellington.

CLIMATIC conditions in the South Island necessitate the growing of supplementary feed crops for use during the winter, and it is for this reason that the bulk of the root crops grown in the Dominion are found here. The South Island also provides most of the cereal, pulse, and grass and clover seed crops. The North Island, on the other hand, with its warmer climate and heavier rainfall, is not so dependent on supplementary feed during the winter, and produces mostly green fodder crops and hay to tide over the difficult period.

Table XXX summarises the acreages devoted to the crops mentioned in this article.

TABLE XXX—ANNUAL CROPS

	Acres.
Cereals, including chaff and greenfeed	567,774
Pulse crops, including chaff and greenfeed	55,691
Root and green fodder crops	606,279
Food and fibre crops	45,889
Grass and clover seed crops .	147,290

1. *Cereals*

Wheat: New Zealand yearly grows approximately a quarter of a million acres of wheat, this acreage producing 8,000,000 bushels of grain. The highest recorded acreage was in the 1891-92 season, when 402,273 acres were grown. However, the Dominion is not self supporting in wheat production, and annually imports about 2,000,000 bushels. Table XXXI shows the annual production over a period of 10 years.

TABLE XXXI—WHEAT PRODUCTION.

Season.	Acreage.	Average Yield. (Bus.)
1933-34	286,271	31.56
1934-35	225,389	26.32
1935-36	248,639	35.63
1936-37	221,790	32.32
1937-38	185,949	32.50
1938-39	189,281	29.40
1939-40	257,532	31.10
1940-41	243,197	34.15
1941-42	258,002	33.61
1942-43	286,998	34.21

By far the greatest acreage of wheat is grown in the Canterbury district (73.6 per cent. last season). Otago, Southland, Wellington, and Marlborough account for practically all the balance. At the moment, Cross 7 is the most popular variety, occupying as it did about 60 per cent. of the total area last year. Solid Straw Tuscan (24 per cent.), Hunters and Dreadnought (5 per cent. each), Fife Tuscan (3 per cent.), Tainui (2 per cent.), and Jumbuck (1 per cent.) are the other varieties of any moment.

Times of sowing depend on the variety and on the district. In Canterbury the bulk of the crop is sown in the late autumn and early winter. Certain varieties, such as Hunters and Dreadnought, are suitable only for autumn and winter sowing, while others, such as Cross 7, Solid Straw Tuscan, and Fife Tuscan, may be sown either in the autumn or in the spring. In Otago and Southland, where spring sowing is almost universal, Cross 7 is largely grown, though Hunters may also be used. Varieties such as Tainui and Jumbuck are more frequently grown in the North Island.

Seed wheat is sown at the rate of 1½-2 bushels per acre, and 1 cwt. of superphosphate or reverted super is applied at the same time as a fertiliser. Harvesting is carried out in the late summer and autumn, and, before the advent of the header-harvester, necessitated cutting with a reaper and binder, stooking, and threshing, either from the stook or from stacks. Header-harvesters, which have increased enormously in popularity and which are rendered successful by the utilisation of Cross 7

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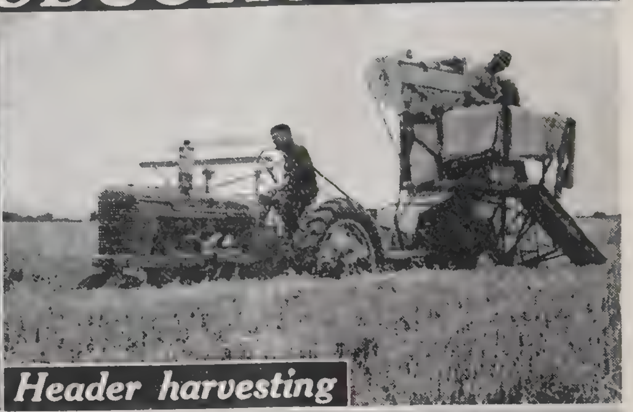
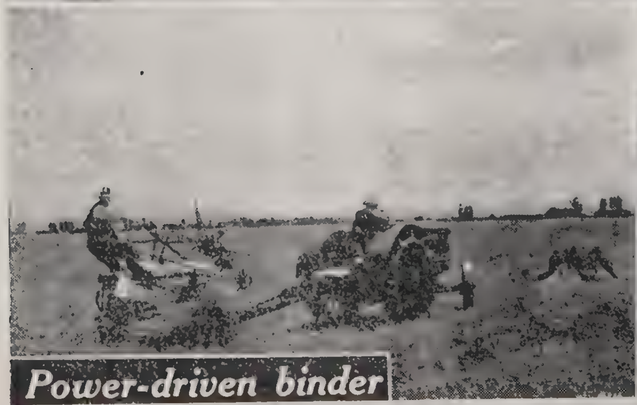
CEREAL PRODUCTION

Cross 7 wheat

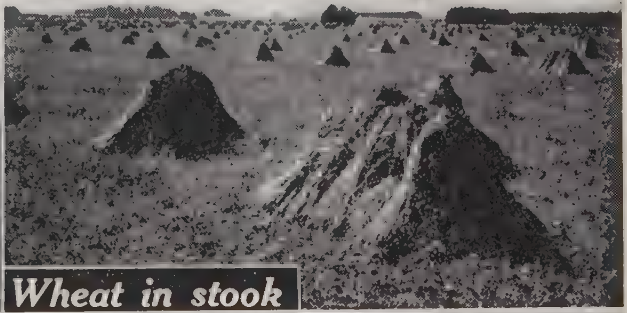


Header harvesting

The Dominion produces annually half a million acres of cereals for grain and stock feeding. From 200,000 to 250,000 acres are devoted to wheat, 60,000 acres to oats for grain, and 200,000 to oats for chaff and greenfeed, whilst barley production is limited to 30,000 acres and maize to 7,000 acres. Canterbury grows over 70 per cent. of the wheat crop, and is also the largest producer of oats and barley.



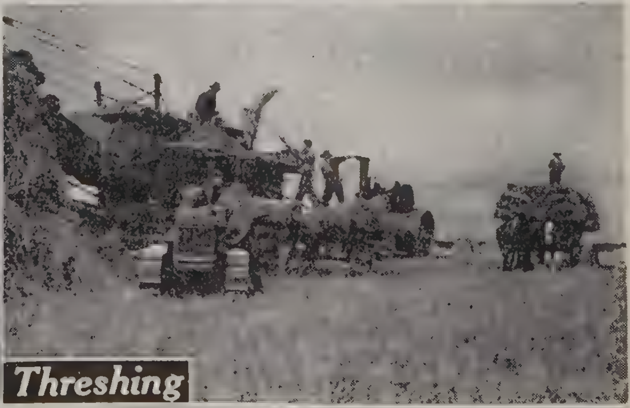
Power-driven binder



Wheat in stook

The growing of cereal crops requires considerable preparation for the seed-bed, which must be firm and reasonably fine. Since wheat is often sown after lea, skim ploughing followed by deep ploughing and subsequent cultivation and fallowing are necessary. Sowing is done by means of a drill with coulters spaced 7in. apart, and the fertiliser is applied at the same time by the same machine.

Stacking



Threshing

Harrowing of the crop when it is about 3in. high is a common practice, the aim being to destroy weeds. When ripe the crop may be cut with a binder and stooked, or direct headed, or mowed and picked up by a header. If stooked, it is either threshed directly or the stooks are stacked and threshing carried out from there. Heading involves a vast saving in handling, but requires care in the selection of the variety of crop used and in determining the right time to operate.

wheat, have simplified the process of harvesting beyond measure.

Oats: Since the record acreage of 449,534 in 1900 New Zealand has grown 60,000 acres of grain oats more or less for the last 10 years. The decrease in oat production has been brought about largely through the replacement of horses by tractors as farm motive power.

Oat production for the last 10 years is shown in table XXXII:—

TABLE XXXII—OAT PRODUCTION.

Season.	Grain. (acres)	Chaff and Greenfeed. (acres)	Grain. (bushels)	Chaff. (tons)
1933-34	70,343	276,386	41.39	1.64
1934-35	52,516	283,902	35.99	1.42
1935-36	77,502	285,794	42.61	1.72
1936-37	74,772	240,932	47.15	1.74
1937-38	57,917	231,846	45.60	1.56
1938-39	54,422	225,374	47.81	1.81
1939-40	49,751	218,890	41.83	1.52
1940-41	71,758	235,186	43.41	1.63
1941-42	70,796	231,612	48.66	1.69
1942-43	56,291	186,074	49.90	1.77

Virtually the whole of the oat crop is grown in the South Island, with Canterbury again in the lead with 61 per cent. of the country's production. Otago and Southland contribute 38 per cent. Garton's Abundance is the principal grain oat, and is normally sown in the spring at the rate of 2-4 bushels per acre, along with 1-2 cwt. superphosphate as a fertiliser. Harvesting takes place in the autumn, when the crop is cut with a binder, stooked, and threshed either from the stook or from the stack. Headers are now being used to some extent for oats.

In the South Island oats for greenfeed are sown in the autumn, usually in a stubble paddock. After providing this fodder they may be closed up and harvested for grain or for chaff as the case may be. North Island sowings for greenfeed are usually ploughed in after grazing and not reserved for grain or chaff. Algerian is the principal variety, and produces very good chaff. Seeding is at the rate of two bushels per acre and 2 cwt. of super or reverted super is sown along with the seed.

Barley: This crop is primarily intended for malting purposes, though a certain amount of grain is used for pigfeed, while a restricted acreage is also grown as greenfeed. Roughly about 25,000 acres are annually devoted to grain, figures for the past decade being given in table XXXIII:—

TABLE XXXIII—BARLEY PRODUCTION.

Season.	Grain. (acres)	Greenfeed. (acres)	Average Yield. (bus.)
1933-34	21,024	8,583	34.77
1934-35	18,441	10,280	26.28
1935-36	20,659	7,118	36.08
1936-37	20,544	4,968	36.36
1937-38	25,455	6,149	42.66
1938-39	26,898	5,630	40.03
1939-40	25,262	6,466	36.25
1940-41	32,025	9,063	33.30
1941-42	36,026	8,405	35.99
1942-43	28,857	6,594	36.91

Malting barley is grown principally in the Canterbury district, though there is an excellent area in Central Otago. Specially-selected barleys of the two-row type are used, and among them are such varieties as Chevallier, Plumage Archer, and Spratt Archer. Barley for use as stock feed is of the six-row type, mainly of the Cape or Black Skinless varieties.

Barley is usually sown in the spring at the rate of 1½-2 bushels per acre. In Central Otago it is sown in the autumn. As a fertiliser 1-2 cwt. of superphosphate or reverted super is applied. Harvesting with the binder takes place in the autumn. After stooking the crop is threshed by means of a "tin-mill" or by a large threshing mill. Heading from the windrow is becoming a more common practice.

Barley for greenfeed is grown in a manner similarly to oats for greenfeed. Sown usually on wheat stubble, cultivation for this crop is a simple process, involving usually only discing or grubbing, followed by harrowing.

2. Pulse Crops

Peas: The Dominion grows about 25,000 acres of peas annually, this acreage being concentrated chiefly in the Canterbury and the Marlborough districts. Acreages and yields for the past decade are shown in table XXXIV.

TABLE XXXIV—PEA PRODUCTION.

Season.	Acreage.	Average Yield. (Bus.)
1933-34	30,362	23.00
1934-35	25,366	17.21
1935-36	24,428	23.04
1936-37	17,512	27.47
1937-38	14,277	26.09
1938-39	13,436	28.80
1939-40	21,323	26.41
1940-41	34,893	21.25
1941-42	30,976	27.51
1942-43	33,006	26.94

About half of the above acreage is devoted to the production of garden varieties. The remainder provides peas for canning, splitting, or stock feed. Common varieties of the latter are Blue Prussian and Partridge. Peas are sown in the spring at the rate of 3 bushels per acre, and are usually sown with 1-2 cwt. of super or reverted super. Harvesting occurs in the autumn, and is now done by a header harvester with pick-up attachment. The peas are cut with a mower and raked into windrows, where, after drying, they are picked up by the header. Prior to the advent of the

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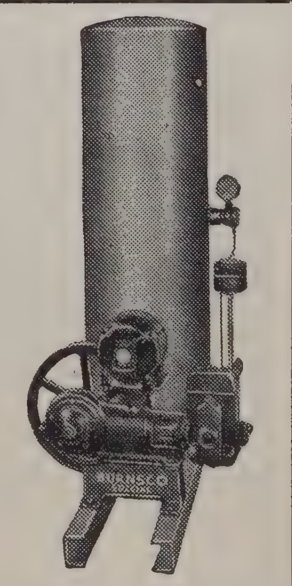
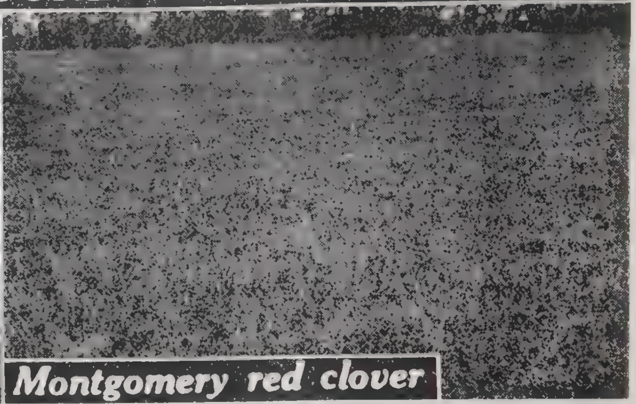


FODDER CROP AND PASTURE SEED PRODUCTION

Harvesting white clover


Montgomery red clover

The production of grass and clover seed is a very important industry in the Dominion. The plant selection work carried out by the Grasslands Division of the Scientific and Industrial Research Department and the seed certification scheme operated by the Department of Agriculture have been of great assistance in developing the industry. The areas annually harvested are: perennial ryegrass 40,000 to 60,000 acres, Italian ryegrass 10,000 to 15,000 acres, cocksfoot 10,000 to 13,000 acres, chewings fescue 12,000 to 15,000 acres, browntop 10,000 to 15,000 acres, white clover 20,000 to 26,000 acres, red clover 20,000 to 26,000 acres.

Chou moellier

Lucerne

To provide feed during periods of low grass production the Dominion grows about 600,000 acres of root and green fodder crops. Turnips and rape are the chief fodder crops, and Canterbury is the largest producer of these crops, where they are grown in rotation with pastures and cereal crops. Canterbury also grows large areas of green cereals for summer and autumn feeding.

Mangolds

Swedes

Chou moellier and kale are used to replace soft turnips and swedes for autumn and winter feeding, and mangolds are grown for feeding in the late winter and early spring. The area under lucerne is slowly increasing, and the crop is used for summer greenfeed and for hay.

header-harvester peas were cut by a mower, raked into windrows, swept into cocks, and threshed. This process was very subject to the vagaries of the weather, and cocks might have to be turned and re-turned to dry them out after rain.

Maize: Maize as an economic crop is possible only in the warmer districts of the North Island. Table XXXV shows the acreages grown during the past 10 years:—

TABLE XXXV—MAIZE PRODUCTION.

Season.	Grain.	Greenfeed.	Average Yield. (Bus.)
1933-34	8,256	8,571	45.20
1934-35	7,946	7,716	46.97
1935-36	7,515	9,051	42.73
1936-37	6,679	6,549	45.21
1937-38	6,147	5,953	48.08
1938-39	6,025	5,959	44.65
1939-40	7,962	6,144	50.76
1940-41	10,763	6,023	47.71
1941-42	8,779	5,229	50.60
1942-43	7,291	5,153	50.87

Of these areas the bulk were grown in the North Auckland, Bay of Plenty, and Gisborne districts. Common grain varieties are Early Butler, Hickory King, Prairie Queen, and Funk's Yellow Dent. Sowing takes place in the late spring, usually in 2 ft. 6 in. rows, seed being planted 1 ft. apart in the rows. Twelve to 15 lb. of seed per acre is required, and 2-3 cwt. super or reverted super is applied at planting time. Harvesting takes place in May, when the ripe cobs are picked off by hand and conditioned in cribs.

For greenfeed 1½-2 bushels of seed per acre are drilled or sown, either broadcast and then disced in, or in the furrow as ploughing proceeds. Three cwt. of superphosphate or reverted super is applied at the time of sowing, usually in October. Ninety Day and Hickory King are popular greenfeed varieties.

Lupins: The statistics do not list this crop separately, but last season 6602 acres were grown for greenfeed and another 3122 acres for seed production. The bulk of the crop is grown in Canterbury. It is a crop which is increasing in popularity, and should go on increasing when the original blue lupin is replaced by the sweet blue or the sweet yellow strains, which latter contain a negligible amount of alkaloid found in the ordinary blue lupin.

For a seed crop the seed is sown either in March or in the spring at the rate of at least 2 bushels per acre, and 1¼ cwt. of super or reverted super is sown at the same time. Drilled in 7 in. drills, the crop is harvested in the summer when the pods are nearly ripe. Lupins are cut with a binder and picked up from the swath by a header with pick-up attachment.

For greenfeed spring sowing is more usual, but autumn sowing, as for a seed crop, is also practised. Feeding off takes place about flowering time, that is, during the summer.

Linseed: As will be seen from the table the area in linseed has dropped off considerably in recent years, but there is likely to be an increase in the near future, due to the erection of a factory in New Zealand to deal with the extraction of oil from the seed.

TABLE XXXVI—LINSEED PRODUCTION.

Season.	Acreage.	Average Yield. (cwt.)
1933-34	1,441	8.72
1934-35	2,930	5.87
1935-36	1,806	6.39
1936-37	614	7.44
1937-38	662	7.83
1938-39	1,821	7.32
1939-40	1,216	7.23
1940-41	1,284	—
1941-42	859	—
1942-43	354	—

The crop is sown in the late spring at 30-40 lb. per acre in 7 in. drills, along with 2 cwt. super or reverted super. Canterbury supplies the bulk of the crop. Harvesting is done in the late summer and is normally carried out by means of binder and threshing mill, though header harvesters are sometimes used.

3. Root & Green Fodder Crops

Lucerne: About 40,000 acres is devoted to the growing of lucerne, this area showing a gradual increase, as is indicated by Table XXXVII. In 1926-27, when figures first became available, 27,787 acres were grown.

TABLE XXXVII—LUCERNE PRODUCTION.

Season.	Acreage.
1933-34	35,906
1934-35	39,087
1935-36	40,857
1936-37	38,802
1937-38	38,691
1938-39	37,023
1939-40	39,614
1940-41	41,665
1941-42	42,221
1942-43	42,842

Sixty per cent. of the total acreage in lucerne is grown in the Canterbury and Otago districts. The remainder is located chiefly in Auckland, Hawke's Bay, Wellington, and Marlborough.

Lucerne requires warm growing conditions, and a low water table is essential, as this plant develops a very deep rooting system. Sown in the late spring or early autumn at 14-16 lb. per acre, lucerne requires a very fine seed-bed, the result of much intensive cultivation. This cultivation also assists in suppressing weeds. Lime is an essential contribution to the welfare of a lucerne stand, and 1 ton per acre, both before sowing and as a topdressing, is not unusual. A crop is not usually harvested until the second season. Cutting is undertaken just when the flowers begin to open, and three or four cuts may be taken during the season. Lucerne is used either for hay or for ensilage, and only occasionally is it grazed.

Turnips and Swedes: The tables do not separate these two crops, but the proportion is in the vicinity of 3 acres of turnips to every 2 acres of swedes. Turnips are more suitable for dry conditions, and this accounts for their greater popularity. Acreages over a 10-year period are given in table XXXVIII.

TABLE XXXVIII—TURNIP AND SWEDE PRODUCTION.

Season.	Acreage.
1933-34	410,084
1934-35	386,604
1935-36	381,949
1936-37	371,485
1937-38	373,534
1938-39	332,628
1939-40	345,884
1940-41	341,430
1941-42	336,913
1942-43	327,058

Turnips are distributed fairly evenly through the country, while swedes are found in the wetter districts such as Southland and Auckland. Turnips are divided into two groups, viz., yellow-fleshed or "hard" and white-fleshed or "soft." White-fleshed turnips are the more widely grown. Swede varieties are N.Z. Superlative, N.Z. Grandmaster, N.Z. Crimson King, N.Z. Resistant, and N.Z. Sensation. Yellow-fleshed turnip varieties are N.Z. Green Top Yellow, N.Z. Green Resistant, N.Z. Purple Resistant, and N.Z. Purple Top Yellow. Varieties of white-fleshed turnips are N.Z. Green Globe, N.Z. Purple Globe, and N.Z. Red Globe.

Turnips are sown in the late spring, while swedes are sown in the summer. Turnips are usually sown "on the flat" at 10-14 oz. per acre. They may be drilled or broadcast. Swedes are normally sown on ridges in the South Island at 12-14 oz. per acre, the aim being to facilitate intercultivation. In the North Island sowing on the flat is common. Super or reverted super at 1½-2½ cwt. per acre is sown with the seed.

Soft turnips are fed off in "breaks" and are used for fattening lambs and other stock. Hard turnips are reserved for use in the autumn, when feed is normally at a low ebb. Swedes are kept as supplementary feed for winter use. The tops are eaten off by lambs or by broken-mouthed ewes, and the bulbs are fed off in situ or carted off and fed out as required.

Rape, Kale, and Chou Moellier: These crops have similar characteristics and are herein treated together. Last year 160,765 acres of rape were grown and 64,427 acres of kale and chou moellier. Chou moellier is more widely grown in the dairying districts, while rape is spread throughout the

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mixed farming areas, over half the total being grown in Canterbury. Sown in the spring at 2-3 lb. per acre, these crops are drilled with 1½ cwt. of super or reverted super per acre, spacing being 28 in. between rows, except for rape, which is usually sown in 7 in. drills. Rape is fed off in "breaks" and is generally used for fattening lambs and for summer feed generally. Kale and chou moellier are grown to provide winter feed. Chou moellier is generally cut and carted off as required, though where sheep are available these may be used to eat off the lower leaves while cattle complete the work.

Mangolds: This is predominantly a crop for cattle, though it is also used for pig feeding. Mangolds require a warmer climate and a richer soil than those needed for turnips or swedes.

There has been a gradual decrease in acreage over the past 10 years, as table XXXIX shows:—

TABLE XXXIX—MANGOLD PRODUCTION.

Season.	Acreage.
1933-34	13,745
1934-35	11,211
1935-36	13,210
1936-37	10,279
1937-38	8,270
1938-39	8,872
1939-40	9,610
1940-41	9,219
1941-42	7,847
1942-43	6,126

Mangolds are sown in the late spring at 4 to 6 lb. per acre, usually on ridges 28 in. apart. Three cwt. of super, or 4 to 6 cwt. of mixed fertiliser, is sown with the seed. Canterbury provides 46 per cent. of the total acreage, Otago 21 per cent., and Wellington 17 per cent., the remainder being fairly evenly distributed throughout the other districts.

As they contain a poisonous principal when fresh, mangolds have to be lifted and "pitted." After storage for some time they are fed off to stock as required. The principal varieties of mangolds are Yellow Globe, Orange Globe, Long Red, and Red Intermediate.

4. *Food and Fibre Crops*

Potatoes: The potato crop is of considerable economic importance in this country. Last season 23,860 acres were planted and yielded on the average 5.8 tons total per acre. Figures for the last 10 years give the following information:—

TABLE XL—POTATO PRODUCTION.

Season.	Area.	Average Yield. (Total) (Tons)
1933-34	25,028	5.24
1934-35	23,001	4.74
1935-36	22,958	5.27
1936-37	22,462	5.62
1937-38	23,090	6.36
1938-39	18,023	4.86
1939-40	20,033	7.04
1940-41	16,998	5.54
1941-42	15,201	5.89
1942-43	23,860	5.83

The Canterbury district supplied just over 50 per cent. of this acreage, Wellington, Otago, and Southland accounting for another 25 per cent. The balance of the crop was distributed fairly evenly throughout the country. Of the varieties planted, Aucklander Short Top (Suttons), Dakota, Arran Chief, Inverness Favourite, and King Edward predominated.

The North Island caters principally for the early trade, while the main crop comes from the South. Main crop potatoes are planted in October at the rate of 16-20 cwt. to the acre, with 3 to 4 cwt. of superphosphate, or, better, 3 cwt. super and 1 cwt. sulphate of ammonia. Potatoes for early consumption are planted in the northern areas in the autumn and early in the spring in other districts, provided there is no danger of frost at that time. Intercultivation is carried out until the size of the haulms makes this impossible Spraying to control disease is essential with early potatoes in North Auckland. Harvesting occurs during the months of May, June, and July, after which the potatoes are stored to protect them from frost. "Seed" is usually separated at the time of picking up. If the tubers are stored for any length of time, it may be necessary to pick them over to remove those rotten or frosted.

The scheme of seed certification carried out by the Department of Agriculture has resulted in a marked increase in yield, emphasis in this scheme being placed on freedom from virus diseases, which are responsible for reduced cropping power.

Onions: There are three main onion growing districts in New Zealand, viz., in the Franklin, Horowhenua, and Waimairi Counties. During the past decade these areas and other minor areas have made up the following acreages:

TABLE XLI—ONION PRODUCTION.

Season.	Acreage.	Average Yield (Tons)
1933-34	1112	8.50
1934-35	923	6.06
1935-36	928	7.64
1936-37	719	8.25
1937-38	618	7.73
1938-39	674	10.28
1939-40	839	9.56
1940-41	903	9.11
1941-42	825	10.21
1942-43	962	10.81

Onions are normally sown in the early spring at 5-7 lb. per acre, with 7 cwt. super or reverted super. In the Franklin County autumn sowing and subsequent transplanting is the more usual procedure. Intercultivation is carried out at frequent intervals and hand weeding may be required between the bulbs themselves. When the tops are mature the crop is pulled and placed into windrows to dry. The tops are later trimmed off and the onions bagged or crated.

Common varieties are Pukekohe Long-keeper, Straw Spanish, and Brown Globe.

Linen Flax: The production of this crop has arisen directly out of the war. Prior to that it was merely an experimental venture. As table XLII shows the acreage has jumped from nil in 1938-39 to 21,000 acres in 1942-43.

TABLE XLII—LINEN FLAX PRODUCTION.

Season.	Acreage.
1938-39	—
1939-40	403
1940-41	13,118
1941-42	20,200
1942-43	21,067

This acreage is confined to the South Island in close proximity to the factories employed in the processing of the straw.

The crop is sown in the late spring at 80-90 lb. per acre and 2 cwt. super or reverted super is sown with the seed. Seven-inch drills are normal and the crop is pulled just after flowering, when colour starts to appear in the stem. After pulling the crop is stacked and in due course carted to the

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factory, where it is de-seeded, retted, and scutched to extract the fibre. Varieties in use are Liral Crown, Liral Prince (blue-flowered varieties), and Concurrent (white-flowered variety).

5. *Small Seed Crops*

These include the grasses and clovers.

Perennial Ryegrass: As with most of the small seed crops, this seed is produced from surplus growth on areas intended previously for grazing by stock. A considerable area is devoted to the production of this seed, as table XLIII shows:—

TABLE XLIII—PERENNIAL RYEGRASS SEED PRODUCTION.

Season.	Acreage.	Average Yield (lb.)
1933-34	38,989	324.7
1934-35	54,012	316.9
1935-36	53,552	363.3
1936-37	24,064	265.5
1937-38	27,779	302.7
1938-39	47,646	268.1
1939-40	43,895	305.3
1940-41	62,590	325.8
1941-42	53,903	302.2
1942-43	38,793	300.0

Sown in the autumn with white clover or other species, perennial ryegrass is usually harvested during the next autumn, after providing pasture in the spring. Seed is sown at 1 to 1½ bushels per acre, usually together with white clover and with 1½ cwt. per acre of superphosphate or reverted super. Topdressing in the autumn with a similar amount is normal. Formerly cut with a binder and threshed from the stook, perennial ryegrass is now usually cut with a mower, raked into windrows, and, when dry, threshed with a pick-up header. Time of closing for seed production is an important factor in achieving success, and normally takes place in November. The principal areas producing seed are Canterbury, Otago, Southland, and Hawke's Bay.

Italian Ryegrass: Remarks similar to the above apply to this crop, except that it is an annual by nature. Table XLIV shows the position in regard to seed production of this species during the past decade.

TABLE XLIV—ITALIAN RYEGRASS SEED PRODUCTION.

Season.	Acreage.	Average Yield (lb.)
1933-34	6,941	360.6
1934-35	12,436	306.0
1935-36	13,073	471.3
1936-37	5,603	332.0
1937-38	5,544	386.0
1938-39	7,024	328.2
1939-40	6,843	379.6
1940-41	15,234	419.9
1941-42	11,789	395.2
1942-43	9,590	396.2

The sowing of this crop for seed is practically confined to the South Island. This species may be sown pure or with white or red clover.

Cocksfoot: For a seed crop cocksfoot must be sown pure. Contamination with ryegrass is especially to be avoided, as the two seeds are difficult to separate at machine dressing. Further, for a successful seed crop the area is not grazed at any time.

Production is centred in the South Island, the chief districts being Canterbury, Otago, and Southland. The acreage involved has been fairly constant over the past 10 years, as table XLV shows:—

TABLE XLV—COCKSFOOT SEED PRODUCTION.

Season.	Acreage.	Average Yield (lb.)
1933-34	9,496	76.3
1934-35	12,309	152.4
1935-36	13,516	101.7
1936-37	12,973	142.1
1937-38	11,620	164.8
1938-39	12,825	206.2
1939-40	10,255	103.7
1940-41	9,977	142.9
1941-42	10,624	143.9
1942-43	10,169	124.7

Cocksfoot is harvested on the larger areas with binder and mill or mower and header, but smaller and more difficult areas, such as are found on Banks Peninsula, are cut with a sickle and threshed with a flail.

Chewings Fescue: Seed production from this grass is confined to the Southland district, where it grows on the poorer land. The seed, most of which is exported, formerly found its way chiefly to America, but difficulty in maintaining its germination during transit has made it less popular in the importing country. The crop is of little importance as a fodder producer, as the grass itself is very wiry. However, it is usually grazed occasionally throughout the season. Every few years skim ploughing in the autumn after harvesting becomes necessary to break the turf, as it tends to become sod-bound. Harvesting is carried out by cutting with a binder and threshing out of stook. Table XLVI sets out

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the acreage and yields for the past 10 years:—

TABLE XLVI—CHEWINGS FESCUE SEED PRODUCTION.

Season.		Acreage.	Average Yield. (lb.)
1933-34	....	7,834	179.1
1934-35	....	11,294	107.5
1935-36	....	13,768	171.8
1936-37	....	11,417	155.2
1937-38	....	8,162	121.9
1938-39	....	11,605	164.32
1939-40	....	13,905	179.9
1940-41	....	15,051	169.6
1941-42	....	13,900	173.2
1942-43	....	14,973	179.1

Red Clover: There are two chief types of this clover, viz., the hay or cowgrass type, and the pasture or Montgomery type of red clover. Both are important strains, and as the table shows a considerable acreage, which has increased substantially in the last two seasons, is devoted to the production of seed.

TABLE XLVII—RED CLOVER SEED PRODUCTION.

Season.		Acreage.	Average Yield. (lb.)
1933-34	....	11,565	159.0
1934-35	....	13,469	140.4
1935-36	....	10,654	169.6
1936-37	....	11,578	162.6
1937-38	....	8,809	146.2
1938-39	....	7,079	140.6
1939-40	....	7,977	148.0
1940-41	....	13,252	136.6
1941-42	....	23,458	151.6
1942-43	....	26,530	134.9

For seed production red clover is normally sown alone in the spring at 4 lb. per acre, as it tends to dominate other species. However, cowgrass may be sown with Italian ryegrass to increase the bulk of material produced in the hay crop. After providing an early crop or hay or being grazed in the spring the area is shut up and allowed to seed, this occurring in March or April. The material is cut with a binder, raked into windrows, and threshed out of stack or picked up by a header. Cowgrass persists for one or two years, but Montgomery red clover is more perennial in nature.

White Clover: This species may be considered in a manner similar to that described above with respect to red clover. White clover is normally sown with perennial ryegrass, and both seeds are frequently harvested together and the seeds separated at machine dressing. By later closing of the paddock an almost pure white clover seed crop may be obtained. Table XLVIII shows the position for the past decade:—

TABLE XLVIII—WHITE CLOVER SEED PRODUCTION.

Season.		Acreage.	Average Yield. (lb.)
1933-34	....	6,698	124.6
1934-35	....	10,292	129.8
1935-36	....	6,584	119.4
1936-37	....	9,237	117.8
1937-38	....	4,800	115.1
1938-39	....	7,182	120.2
1939-40	....	8,841	117.4
1940-41	....	20,141	116.3
1941-42	....	25,513	110.5
1942-43	....	26,360	114.6

As with red clover, the greater proportion of white clover is harvested in the South Island.

Browntop: This grass is found on the foothills of the Southern Alps on third-class country, where it provides grazing for sheep, but it is never sown with the intention of producing a seed crop. Seed harvesting is undertaken in Otago, Southland, and Canterbury, most of the produce being imported. As the areas are so large and the yield so light, harvesting is done mainly by a stripper, which strips the seed off the stalks as it passes over the area. As will be seen the acreage harvested is considerable, while the yield is relatively low.

TABLE XLIX—BROWNTOP SEED PRODUCTION.

Season.		Acreage.	Average Yield. (lb.)
1933-34	....	7,936	33.9
1934-35	....	15,140	25.8
1935-36	....	14,936	20.1
1936-37	....	15,579	26.9
1937-38	....	10,314	25.5
1938-39	....	9,695	22.9
1939-40	....	15,349	24.7
1940-41	....	8,750	31.0
1941-42	....	9,840	29.5
1942-43	....	10,487	26.0

Brassica Seeds: These include rape, kale, chou moellier, turnips, and swedes. While rape was grown for some years prior to the war, production of the other species named received an impetus when war rendered their importation impossible. Last season 1826 acres of rape and 944 acres of kale and chou moellier were grown to produce seed. Sown in the autumn at 4 lb. per acre in 7 in. drills, rape is not grazed at all, and in the spring the crop runs to seed. Harvesting takes place when the seed "pods" are ripe. Kale and chou moellier are treated in a similar manner, except that they are sown during November.

Swedes for seed occupied 543 acres last season, white-fleshed turnips 1177 acres, and yellow-fleshed turnips 567 acres. The saving of these crops is practically confined to the Otago and Southland districts. Seed is sown in February at 3 to 4 lb. per acre in 7 in. drills. The bulbs attain a diameter of only one or two inches before the winter and produce seed stalks in the spring.

The harvesting of all of these crops is normally done with a binder. If the crop is to be threshed immediately, the sheaves are stooked, but if stacking is contemplated, the sheaves are left on the stubble to mature the seed and then stacked.

◆

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Copper Deficiency in Cattle and Sheep

Occurrence and Control in N.Z.

FOR many years it has been recognised that dairy farming in New Zealand on reclaimed peat swampland is attended by numerous hazards. Not only have there been difficulties associated with drainage, pasture establishment, and general management, but stock health has also been considerably below normal. Even when good pastures have been established adult stock have been unthrifty, and often definitely diseased, production has been disappointingly low, and the rearing of young stock for replacement purposes has always been difficult and frequently impossible.

By

I. J. CUNNINGHAM,
Animal Research Station,
Wallaceville.

CONTROL of the unthriftiness of cattle on peat lands and treatment of the severe scouring which frequently afflicts them for long presented an insoluble problem. Eventually two different methods were evolved. The first was to remove the animals for a period each year to country of different soil type; the second to treat them, without removal, by drenching with mixtures of bluestone and nicotine sulphate or with bluestone alone. The first method effected some control of unthriftiness and scouring; the second removed the acute symptoms of scouring.

The practice of drenching with bluestone and nicotine sulphate arose from the known efficiency of these materials in dealing with internal parasites, infestation with which was argued from the scouring symptoms. When, however, the present series of investigations into peat land scouring were undertaken it was realised that the curative properties of bluestone were capable of another interpretation. In short, the effectiveness of bluestone treatment suggested the possibility that an actual dietary deficiency of copper might exist, and that this deficiency might be the cause of the disease. Prosecution of this line of inquiry has shown that many peat areas are undoubtedly deficient in copper, and that the copper deficiency is, in fact, responsible for the ill health, losses, and low production in cattle and calves.

Some time after its inception the hypothesis of copper deficiency received interesting support when the Government veterinarian at Hamilton, Mr. H. Doyle, diagnosed *enzootic ataxia* (irregular gait) in lambs bred on peat soils similar to those on which cattle scouring occurs. This disease of lambs had previously been described in Australia and in England and was known to result from an insufficient intake of copper.

The purpose of this article is to outline the reasons that have led to the conclusion that a copper deficiency does, in fact, exist in New Zealand and to describe the symptoms of copper deficiency in animals, together with methods whereby the deficiency can be made good.

Location of Affected Areas

A survey of New Zealand has not yet been completed, so that it is not possible at the present stage to define accurately the areas which are deficient in copper.

Most of the reclaimed swamps and peaty soils so far examined have proved to be copper deficient, and a deficiency has also been recorded on some pumice soils and peat pumice mixtures.

Reclaimed swamps or peaty soils known to be deficient in copper are those at Ruakaka, North Auckland, many in the Hamilton district, the peat soils of the Hauraki Plains, peat soils at Waitoa, Patetonga, Pongakawa, Hawke's Bay, Ladbrooks, near Lake Ellesmere, Christchurch, and in some parts of the Southland district.

Peat pumice mixtures and pumice soils known to be deficient occur in parts of the Rangitaiki Plains, including areas near Awakeri and Otakiri.

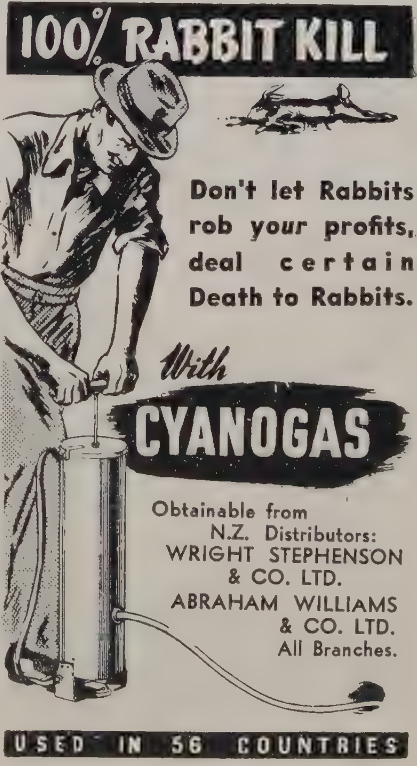
An estimate of the total area affected is not easy to arrive at. The area of pumice soils at present known to be deficient is small, being only a few thousand acres. The area of affected peat soil is, however, very considerably higher. From maps prepared by the Soil Survey Division, Department of Scientific and Industrial Research, it is known that there are at least 400,000 acres of peat deposits in New Zealand. About two-thirds of this has been drained, and much of the drained area is developed or in process of development for agricultural use. Representative areas of most of the fully- or partly-developed peat areas have already been shown to be deficient in copper. Copper deficiency, therefore, affects at least one to two hundred thousand acres of land, much of which is closely settled and employed for dairying.

Symptoms In Animals

Dairy Cattle.

The acute form of the condition affecting dairy cattle is popularly named peat scours, an appropriate title, since the disease is most commonly seen on peat soils and since the most characteristic symptom is persistent, severe debilitating scouring. Scouring occurs whenever there is a flush growth of pasture—in other words, practically every spring, and frequently also in the autumn when a dry spell is followed by warm rains. The scour is almost continuous, thin and watery, yellowish green to black in colour, and contains numerous small bubbles.

Spring scours persist for several months, occasionally commencing in severe form as early as July while



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cattle are dry and still receiving hay, but usually being most marked after calving and during September and October. Dairy cattle on copper-deficient country do not come through the winter well, and with spring scouring there is a further noticeable loss of condition. The coat is rough, the animal becomes tucked up in the flanks and dejected in appearance, vitality is reduced, and there is frequently difficulty in getting cows in calf. Occasionally debilitation proceeds so far that the animal dies or must be destroyed. The accompanying photographs illustrate the appearance of peat scours cases.

Spring scouring frequently clears up without treatment during November, when the feed hardens, and cattle improve in condition by December or January. Scouring ceases if stock are turned out to rough feed or removed to areas of different soil formation.

Bulls are also susceptible to peat scours, but usually do not lose condition to such a marked degree as do milking cows.

The autumn scour is usually much less severe than the spring scour.

Milk and butterfat production are minimal when scouring is severe, and are, in fact, low for the whole season.

On some affected areas acute scouring does not occur, but cattle are unthrifty, poor in condition, slow in development, and low in production.

Young stock are affected even more severely than adults, and in many cases replacements cannot be reared unless weaned calves are sent away to areas of different soil type. Calves which are reared on copper-deficient country develop poorly; as yearlings or two-year-olds they reach a much smaller size than is normal for their breed, and condition is poor even when there is ample feed available. Scouring has been reported in calves shortly after they commence to eat grass, but is at its worst during the winter and spring when the animals reach yearling stage. Many of the yearlings die unless they are sent away or are treated.

Young stock on "peat scour" country appear to be more than usually susceptible to infestation by internal parasites, and this undoubtedly contributes to the difficulties in rearing them.

On some areas marked bone fragility occurs in calves from the age of about three months onward. A slight knock is sufficient to cause fractures. This condition has not yet been definitely proved due to lack of copper, but is associated with a low copper intake.

All breeds of dairy cows are susceptible to peat scours, but there is a fairly widely-held belief amongst farmers that Jerseys are more likely to succumb to its effects than Shorthorns or Friesians.

Beef Cattle.

Beef cattle are susceptible to peat scours if they are kept for long periods on deficient areas. Scouring symptoms are not prominent while the animals are running on rough unimproved areas, but develop in severe form if they are transferred during spring, for fattening, to lush pastures still on copper-deficient country. Loss of body condition is, however, not so marked as in dairy cows, and during summer and autumn cattle fatten well.

In some black cattle which have been kept for long periods on copper-deficient country the coat colour changes from black to a muddy brown colour.

Difficulties are experienced in attempting to breed beef cattle on some of the more severely deficient country; some calves die at, or soon after, birth, and some of the remainder develop symptoms of paralysis similar to those which will be described in lambs. The surviving calves develop at a slower rate than is normal for the breed.

Sheep.

Adult sheep show little effect even when kept on copper-deficient country for long periods. There is, however, evidence which will be presented later that wool production may be somewhat decreased.

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If ewes are brought in fresh each year from normal country, they can produce and rear normal lambs. From a small percentage of ewes two crops of normal lambs can be taken in successive seasons. If, however, ewes are kept for longer periods on deficient country or are reared there, the tendency is for their lambs to have fragile bones or to become affected with a paralysis. Bone fragility appears to be the earlier manifestation on copper-deficient country, and paralysis occurs if the deficiency has been more severe or more prolonged.

Some of the lambs may die or become paralysed at or near birth, and this is a manifestation of the more severe form of copper deficiency. In most of the cases in New Zealand a less severe type has been encountered, and in this a proportion of the lambs become affected at the age of about 2-4 months. Occasionally all four limbs are affected and the lamb cannot walk. Most commonly the hind limbs are affected and the gait becomes inco-ordinated, so that the rump sways from side to side when the lamb attempts to walk. The amplitude of the swaying may increase so that the lamb swings partly round and the rump drops to the ground, with the result that the lamb adopts a dog sitting posture.

The condition may be latent and develop only after exercise, it may be of such degree that the lamb can move but always with a wobbly, swaying gait, or it may be so severe that locomotion is impossible. Provided that lambs can move about, they will feed and grow and eventually some even fatten. Lambs which are unable to move about to collect food will, of course, die from starvation.

Australian workers have named this disease in lambs *enzootic ataxia*, and this name has been adopted in New Zealand.

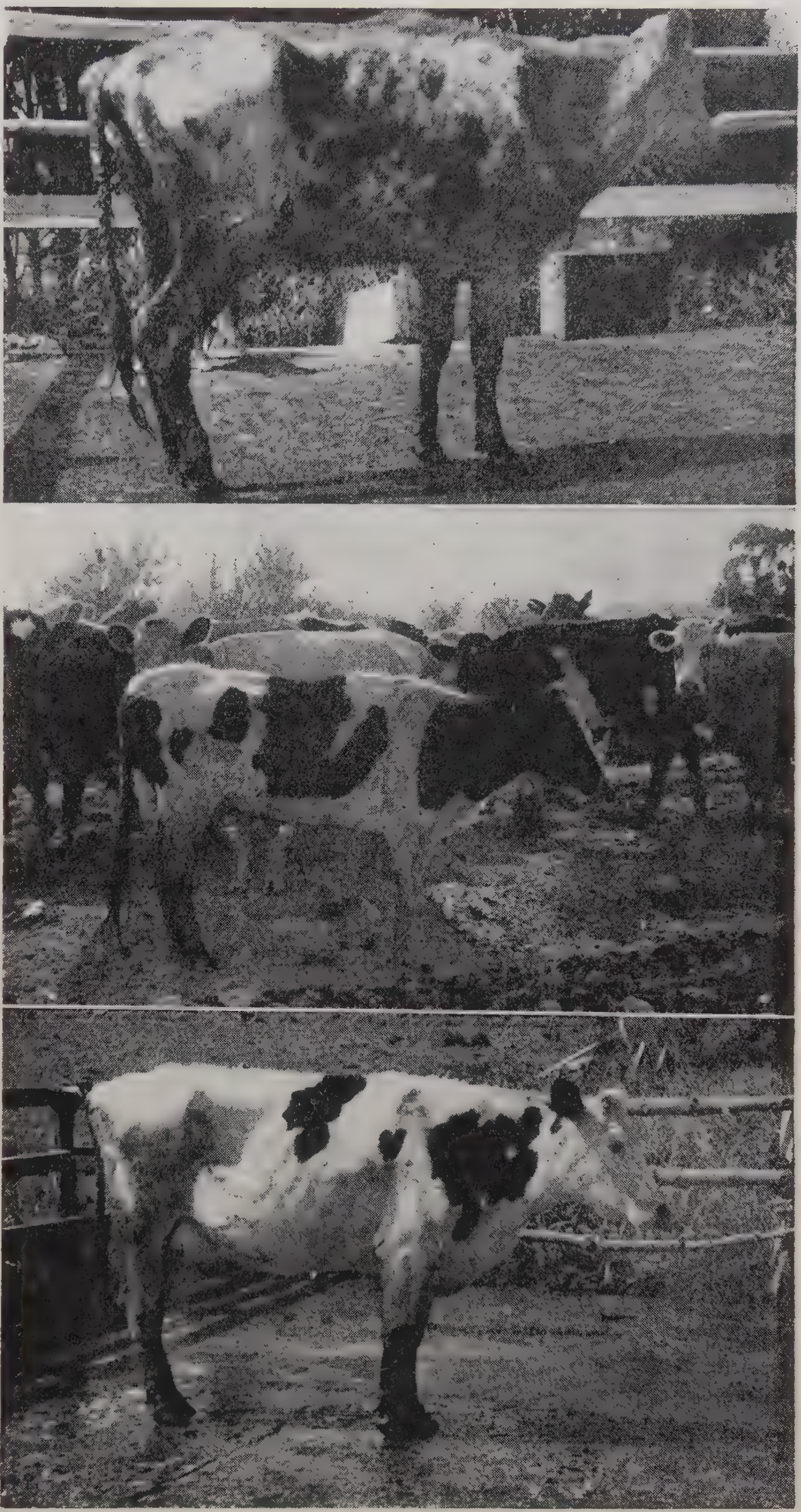
Sheep are less susceptible to copper deficiency than cattle, and it is only on the more severely deficient country that disease in lambs is seen. On mildly deficient country, where cattle become affected, sheep will do well.

Other Animals.

Adult horses do very well on areas where cattle and even sheep are affected. Breeding is not practised on severely affected country, but numerous healthy, well-developed foals have been seen on mildly deficient land.

There is little evidence of ill health in pigs, though some reports have been received of paralysis in pigs similar to that seen in lambs. No direct evidence has been obtained as to whether this is caused by deficiency of copper, but it is of interest that Australian workers have reported a simi-

Typical Cases of Peat Scours



lar condition in pigs on copper-deficient areas in Western Australia.

EVIDENCE THAT COPPER DEFICIENCY EXISTS.

A number of lines of evidence, set out below, have been examined in reaching the conclusion that the conditions described in cattle and in sheep are due to copper deficiency. These lines are as follows:—

1. The pastures contain less copper than normal.
2. Animals which have been kept for some time on suspected country contain much less than normal amounts of copper in the blood and liver.
3. Administration of copper cures or prevents scouring and unthriftiness in cattle and calves and prevents the development of paralysis in lambs.

Copper Content of Pastures

The copper content of normal pastures lies between 10 and 15 parts per million parts of dry grass. The value alters with stage of growth, being, for example, higher in young green grass than in mature grass at the hay stage.

Large numbers of pasture samples have been examined in the course of the present investigation, but, for simplicity, only a few figures will be quoted to illustrate the degree of deficiency that is encountered in New Zealand. Samples were all taken at the young green stage, that is, at the stage when the copper content should be high.

TABLE I.

COPPER CONTENT OF PASTURES FROM DEFICIENT AREAS.

PARTS PER MILLION OF COPPER IN DRIED GRASS.

		Animals affected.
Normal	10-15	
Samples collected at—		
Puketaha	4.2	Dairy cattle
Gordonton peat areas	5.4 to 7.5	Dairy cattle
Waitoa	2.5	Sheep
Waitakaruru	2.1	Sheep and beef cattle
Pongakawa	2.8	Dairy cattle
Rangitaiki Plains ...	3.4	Dairy cattle
Ruakaka-North Auckland	3.9	Dairy cattle
Hawke's Bay	5.1	Beef cattle

The figures quoted represent the lowest copper content recorded for the districts indicated. There are some variations from paddock to paddock and with season. The seasonal variation is such that spring samples contain the lowest proportion of copper, whilst samples taken from the same paddock during summer are higher.

All samples were collected from areas where the diseases described above occur, and the species of animal affected is shown in the final column of Table I.

A deficiency of copper in the pastures, as compared with those from normal areas, is clearly evident.

Copper in Bloods and Livers

The copper content of the liver varies directly with the intake of copper in the food. On diets of normal copper content the copper contents of livers from any one species of animal fall within limits which can be broadly defined. If the copper intake is materially increased, the liver copper is increased; if the copper intake is considerably reduced, the copper content of the liver becomes smaller. It follows that a comparison of the copper content of the liver of an animal with the known normal content for the livers of the same species gives a reliable indication of the copper intake of that animal.

The liver lags somewhat in yielding up its copper after the animal has been placed on a copper-deficient diet. It is essential, therefore, that livers be examined only from those animals which have been bred on one area or have lived there for a period of one to two years.

Not only is the copper content of the adult liver reduced by a low copper intake, but also the liver of the new-born calf or lamb contains very

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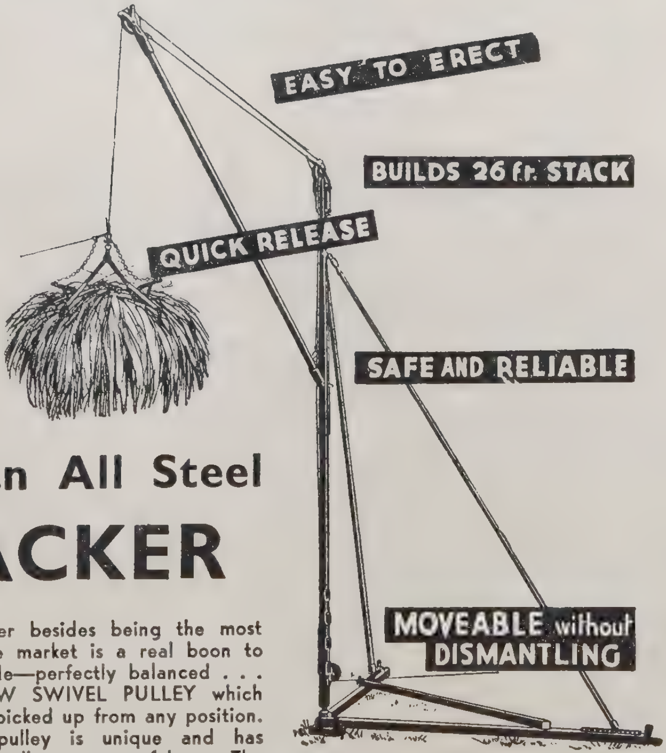

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much less than the normal amount of copper. This is of special value in studying peat scours, because, while it is not always possible to obtain livers from adult cows, bobby calves are always available on dairy farms.

Blood copper has a somewhat similar significance to liver copper in respect to copper intake. It differs chiefly in indicating the existing status of copper supply rather than in giving, as does the liver, an indication of the summation effect of the copper intake for a relatively long period.

Table II shows the average copper contents of livers and bloods from cattle affected by peat scours, of bobby calves from farms where peat scours occur, and livers and bloods of sheep and lambs from areas where *enzootic ataxia* (paralysis) occurs. The normal values, obtained on specimens collected from areas where neither of these diseases has ever occurred, are included for comparison.

TABLE II.—COPPER CONTENTS OF LIVERS AND BLOODS *

	Bobby Calf	Cow.		Lamb.		Ewe.	
	Livers.	Livers.	Blood.	Liver.	Blood.	Liver.	Blood.
NORMAL ..	360	210	0.10	400	0.09	520	0.09
Peat Scour Cases ..	57	9.7	0.02	—	—	—	—
***Enzootic Ataxia* Cases**	—	—	—	16.2	0.03	23	0.03

* Liver values are expressed as parts per million of copper in dry liver; blood values as milligrams of copper in 100 millilitres of blood or approximately parts of copper per 100,000 parts of fresh blood.

The table shows very clearly that in cases of peat scours and *enzootic ataxia* there is much less than the normal amount of copper in liver and blood. As stated earlier this is strong evidence that the fodder is deficient in copper.

Treatment with Copper

Treatment with copper will be dealt with in detail in the next two sections. At this point it is sufficient to indicate that acute cases of peat scours can be cured by dosing with copper; that the health of cattle and calves is greatly improved when the intake of copper is raised to normal, and that *enzootic ataxia* in lambs is prevented if the ewes are provided with the correct supply of copper.

Three lines of investigation, therefore, all indicate that peat scours is due to a deficiency of copper. The food supply contains much less copper than normal, there is much less than the normal amount of copper in the liver and blood of affected animals, and by supplying copper the disease can be prevented or cured.

Similar lines of reasoning apply to *enzootic ataxia* of lambs.

TREATMENT AND PREVENTION OF THE DISEASES.

Since there is clear evidence of a deficiency of copper both in cases of peat scours of dairy cows and of *enzootic ataxia* of lambs, the rational method of treatment or prevention is to increase the copper supply.

Prevention should be the objective wherever possible and is the only method which produces results against *enzootic ataxia.* The scouring symptoms of peat scours may be removed by a short course of treatment with copper solutions, but unless a regular supply of copper is maintained throughout the year, there will be no relief of the other manifestations of copper deficiency, viz., low production and low level of general health.

Cattle

The object is to supply regularly approximately one ounce copper sulphate (bluestone) per week for every eight adult beasts. The amounts for young stock should be approximately in the ratio of their body weight to that of adults.

Copper can be supplied by—

(a) Drenching bluestone solutions.
(b) Addition of bluestone to drinking water.
(c) Licks.
(d) Topdressing the pastures with bluestone.

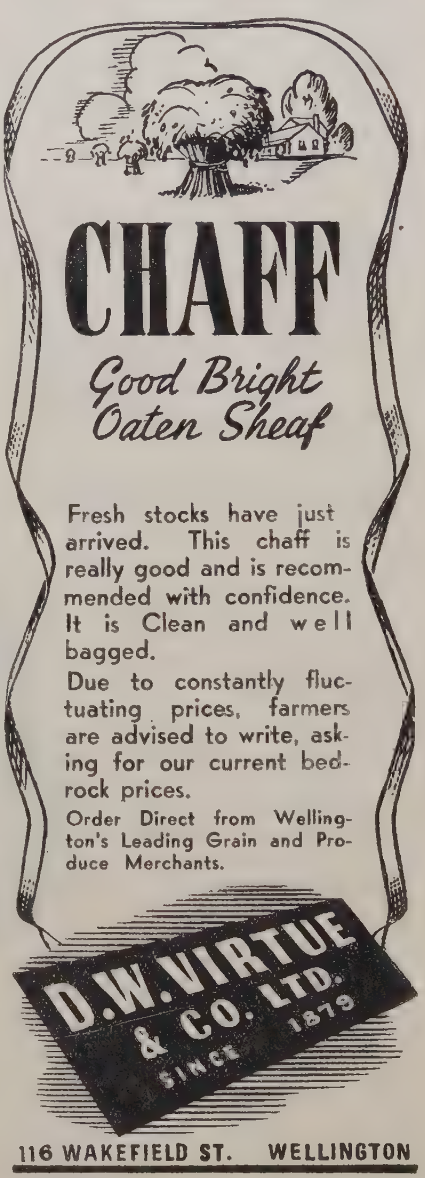
(a) **Drenching** is suitable for the treatment of acute cases of peat scours, but is somewhat laborious as a routine procedure to maintain a regular normal intake of copper.

To make the drench one ounce of bluestone (copper sulphate) is dissolved in one gallon of water and one pint of this solution is given for each drench. Most cases of scouring will clear up after one drench and scouring will not recur for several weeks. In some cases the drench must be repeated several times at two-day intervals before a response is obtained. If the symptoms are not relieved after 4-5 drenches, some condition other than peat scours should be suspected.

Treatment of acute peat scours by this method removes the symptoms of scouring, but does not relieve copper deficiency. The treated animal, though not scouring, will still be suffering from lack of copper, and its health and production will be below normal.

If drenching is adopted as a means of raising the copper intake to normal, it would be necessary to drench once per week throughout the whole year one pint of the mixture described above to every adult animal and a smaller volume to all young stock.

A note on the toxicity of copper is desirable. It is known that too much copper is dangerous to sheep. This point will be dealt with more fully later. Cattle appear to be rather more resistant to regular administration of copper, and experimental work carried out at Wallaceville has shown that the drenches mentioned above can be repeated at more frequent intervals than those recommended, without ill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effects. These experiments were conducted to obtain information on toxicity and to determine safe limits for dosage. In practice the recommended rates should be closely adhered to. It is particularly important that the individual doses recommended be accurately measured, since higher doses may be harmful. New Zealand-made bluestone is completely safe and satisfactory for use.

(b) **Addition of Bluestone to Drinking Water.**—This method may be practised where the water supply is in concrete troughs and where there is no contact with galvanised iron pipes. It has the advantage that it is less laborious than drenching; its great disadvantage is the impossibility of ensuring that each animal obtains the correct dose. Bluestone should be added so as to provide a total of one ounce each week for eight adult animals and smaller amounts for young stock, the reduced amount being calculated approximately according to body weight. Additions should be made to the water at least twice per week and preferably oftener. If additions are made twice weekly, the rate should be one ounce for 16 cows; if thrice, one ounce for 24 cows on each occasion, making the total for the week the correct one of one ounce for eight cows.

Difficulties are met in winter when surface water provides part of the intake; difficulties also arise through failure to follow the procedure correctly and conscientiously. The method should not be adopted unless all other means are unsuitable, and then should be continued throughout the whole year.

(c) **Provision of Licks.**—Licks of any composition can be employed provided an intake of one-eighth ounce bluestone per adult beast per week is maintained throughout the year. Two licks have been used experimentally, composition being as follows:—

A.

2 lb. crushed bluestone.
98 lb. agricultural salt.

B.

2 lb. crushed bluestone.
30 lb. steamed bone flour.
68 lb. agricultural salt.

Scouring cattle will usually take the plain salt lick readily; the salt lick B, containing bone flour, appears to be more attractive to run cattle once they have acquired a taste for it, in spite of the off flavour which may develop after wetting.

The main disadvantage of licks is that not all stock will take them. It is particularly important in dairy herds that every animal should be provided with copper so that health and production are maintained and that there are no "boarders."

If either lick A or lick B is provided it should be supplied throughout the whole year to all stock. Not more than one pound per week should be eaten for each two head of adult stock, and the consumption of young stock should be regulated in approximate proportion of their body weight. It is possible that this rate of consumption would not be reached by any but scouring stock or maintained throughout the year. No information is yet available whether licks with higher concentrations of copper sulphate (bluestone) than 2 per cent. are palatable or safe for cattle.

(d) **Topdressing.** The best method of supplying copper is to topdress the pasture with bluestone. The evidence at present available shows that an annual dressing of 5 lb. crushed bluestone per acre is suitable for most of the deficient areas. The areas where this dressing has proved suitable are Piako Road, Gordonton, Ngatea, Waitakaruru, and Pongakawa. At Waitoa and Kerepeehi Block a higher dressing is required, and in these districts 10 lb. per acre should be applied for the first two years and thereafter 5 lb. annually.

Bluestone has been applied alone and mixed with agricultural lime, serpentine superphosphate, superphosphate, and mixtures of lime, serpentine superphosphate, and potash salts. In all cases the copper content of the pasture was increased and in no case was the uptake of copper by the pastures affected by the other fertilisers. It would probably be satisfactory to apply mixtures of bluestone with any fertiliser.

Where superphosphate is employed crushed bluestone can be mixed with this at a rate which will supply 5 lb. bluestone per acre. When superphosphate is not used, as is frequently the case on peat farms, it is recommended that 5 lb. bluestone be mixed with 2 cwt. agricultural lime and the mixture applied at the rate of 2 cwt. per acre. At present it is necessary to mix the ingredients on the farm, since no mixtures are yet on the market. Two hundredweight of lime per acre is suggested, since this is the smallest quantity which will give an even spread and yet limit the labour of mixing and rebagging. More lime can safely be employed, but it is probably easier to run the topdresser over a second time with extra lime than to mix bluestone with a larger weight of lime. Experiments on the production of a copperised superphosphate are being carried out by a New Zealand fertiliser company, and experimental mixtures have already been proved satisfactory as a source of copper for pastures. It is hoped that the mixture will eventually come on the market.

Bluestone mixtures can be applied at any time during the year, but the best practice is to topdress the hay paddocks in spring and the whole of the farm in the autumn and early winter. Hay paddocks thus have a double topdressing in the year. It is essential that animals should not be grazed on topdressed pastures until a good rain has washed in the bluestone.

Five pounds per acre is a minimal level which combines safety, economy, and efficiency in controlling copper deficiency. The whole of the farm must be topdressed at this rate to get satisfactory results. It is realised that many farmers will feel inclined to try out the method first by topdressing a small portion of the farm. The results will be disappointing unless a small number of cattle is selected and the same group of cattle kept on the topdressed area throughout the year.

Cost of topdressing is small—at current rates for crushed bluestone in bulk the cost of 5 lb. is slightly less than 2s. The cost per acre is, therefore, 2s for bluestone, plus charges for lime and for labour of mixing and spreading.

It is desirable to keep a record of the date and the amount of bluestone applied to each paddock, so that at any time the total quantity of bluestone applied to any paddock can be determined. Work on the use of bluestone as a topdressing in New Zealand is still in the very early stages, and it might be necessary at a later date, when more data are collected, to alter the recommendations made here, or to recommend that applications be discontinued for a period after a certain total has been reached on any paddock.

Topdressing has many advantages over other methods of supplying copper. A few of these are as follows:—

1. Every grazing animal on the farm is supplied with additional copper, in its fodder.
2. By applying copper regularly as a topdressing the method of prevention against copper deficiency diseases is being practised. Other methods are likely to be applied as curative methods only, after the animal has been reduced by disease and when health and production have been impaired.
3. There is little chance of neglect or accident resulting in occasional failure to supply copper, or in its being supplied in wrong amount.
4. Copper deficiency is known to affect plant establishment and growth adversely. Topdressing provides the copper necessary for plants as well as for the animals.

Examples of the effect of topdressing on the copper contents of pasture are given in Tables III and IV. The figures in Table III, taken from the results of small plot experiments carried out at Waitakaruru, show the response to different levels of copper application.

The figures in Table IV show the effect of topdressing paddocks with 5 lb. bluestone and 2 cwt. of lime per acre. The last case is taken from experiments at Waitoa, where a dressing of 5 lb. bluestone per acre is considered insufficient, because, though an increase has been maintained over the untopdressed area, the total copper of the treated pasture is too low.

TABLE III.—COPPER CONTENTS OF PASTURES TOPDRESSED WITH DIFFERENT AMOUNTS OF BLUESTONE. FIGURES REPRESENT PARTS PER MILLION COPPER IN DRY GRASS.

All lots Topdressed on 18/2/44.

Rate of Topdressing. Pounds Bluestone per Acre.	Sampling Dates.							
	Feb.*	April.	May.	June.	July.	Aug.	Sept.	Oct.
0	—	3.0	3.6	3.6	3.4	3.0	3.5	3.0
2½	3.5	4.9	6.4	7.8	6.5	7.7	7.6	7.7
5	4.2	5.9	7.9	10.1	9.1	8.6	8.6	8.6
10	3.5	6.0	9.1	11.7	9.8	9.3	11.3	9.2
20	4.0	7.4	10.7	11.7	10.3	10.8	11.8	9.9

* Samples taken before topdressing.

TABLE IV.—COPPER CONTENT OF PASTURES TOPDRESSED WITH 5 lb. BLUESTONE AND 2 cwt. LIME PER ACRE, COMPARED WITH ADJACENT UNTOPDRESSED AREAS.

Date Topdressed.	Date Sampled.							
	Feb.	April	May	June	July	Aug.	Sept.	Oct.
12.3.44	—	13.0	13.1	12.4	7.7	9.1	—	9.4
Adjacent untopdressed area ..	6.0	8.2	6.9	7.7	5.6	7.4	—	8.5
3.4.44	3.5	—	9.2	10.0	9.6	10.0	9.9	7.9
Adjacent untopdressed area ..	4.1	—	3.9	3.9	4.1	4.1	4.2	3.9
12.12.43	24.3	10.7	8.7	10.0	8.6	9.5	9.8	—
Adjacent untopdressed area ..	8.2	8.3	6.4	6.2	5.3	5.9	—	—
16.3.44	—	13.1	7.9	5.7	4.6	—	—	—
Adjacent untopdressed area ..	—	4.1	4.6	2.9	2.7	—	—	—

Sheep

When *enzootic ataxia* in lambs is fully developed treatment is of no avail. Preventive measures must, therefore, be taken by supplying copper to the ewe before the end of gestation. This can be achieved by three methods:—

(a) Drenching the ewes with copper salts.

(b) Provision of copper-containing licks.

(c) Topdressing pastures with copper.

(a) **Drenching.** All-the-year-round drenching of a large mob of ewes is impracticable. If the correct amount of copper is administered during the gestation period, normal lambs can be reared. Experiments carried out in 1943 showed that 16 drenches administered between tupping and lambing effected complete control of lamb trouble and left the ewe with sufficient copper to carry her through to the next tupping season.

In practice this programme of drenching would involve too much labour and handling of the sheep, and experiments are now being carried out with smaller numbers of drenches. Results will not be available until early in 1945.

The 16 drenches which achieved complete control were given at weekly intervals, and one ounce of bluestone made sufficient solution for 20 doses.

(b) **Licks.** No direct experimental evidence has been obtained in New Zealand of the efficacy of licks for sheep, since the only experimental sheep available refuse to take licks. The method would, however, be satisfactory provided due care is exercised. Any lick palatable to sheep would be suitable, and the concentration of bluestone should be so arranged that one ounce bluestone is consumed by 100 sheep every week. Such a concentration would be half a pound of bluestone for each one hundred pounds lick when each sheep eats two ounces lick per week. At this rate it would be essential for the sheep to consume the lick all the year round, and it would be necessary for licks to be available for some time before tupping if control of *ataxia* for that year were to be achieved.

(c) **Topdressing.** Topdressing has the same advantages for sheep as for cattle, and similar rates and methods of application should be employed.

Control of an Outbreak of *Ataxia*: Some success is claimed by Australian workers in arresting the progress of an outbreak of *ataxia* by drenching lambs. The drench is made up by dissolving one ounce of bluestone in 5 gallons of water; each lamb is given two ounces of the solution three times per week.

Elimination of *Ataxia* by Annual Replacement of Ewes: Ewes brought in from country that is normal in copper content have sufficient reserves of copper in their livers to enable them to produce a normal lamb in the first season on copper-deficient country. Where difficulties in supplying copper are too great this method can be employed to secure healthy lambs each season.

Toxicity of Copper to Sheep: Sheep are very susceptible to copper poisoning, and great care should therefore be taken to ensure that the amounts administered do not exceed those recommended above. An example of the toxicity of copper is provided by the fact that if 1½ oz. of bluestone is divided into 30 equal parts and one part fed each day to a big sheep, death will almost invariably result within 30 days.

RESULTS OBTAINED IN PRACTICE BY THE APPLICATION OF CONTROL MEASURES.

Cattle

Drenching: Control of the acute symptoms of peat scours has regularly been achieved by drenching.

Drenching as a preventive has been successfully applied. All cows were drenched once per week for five months from July onwards. Scouring did not occur and health and production were improved.

Supplying Copper in Drinking Water: This method was tried on two dairy farms, administration commencing about March, 1943. On neither farm was there any scouring in the following spring and health and production of the cows was stated to be improved for the season 1943-44.

The experience on both these farms was that it was very difficult to maintain regularity in the additions of bluestone to the drinking water. The procedure was to add, twice each week, one ounce of bluestone for each 16 cows.

Licks: Experiments are in progress on two farms during the present season. The lick employed is formula B, given earlier in this article, and lick was made available from April, 1944. On one farm lick was supplied to all stock, on the other the yearlings, inadvertently, were not supplied with lick. The consumption of lick averaged between 4 and 5 oz. lick per beast weekly.

On both farms scouring this spring has been negligible and is confined to those cows which do not take lick well and to the yearlings which were not supplied with lick. Condition of the stock is good and butterfat production has been increased over that of previous years. Details of production will be given in a later section.

Topdressing: The first topdressing experiments were carried out in 1943, when single paddocks were topdressed. Half the weaned calves on each of three farms were run on those paddocks; the remaining calves were left untreated on the untopdressed area of the farm. The rate of topdressing was 20 lb. bluestone in 2 cwt. lime per acre. The calves on the topdressed paddocks grew and developed very much better than their fellows on untopdressed country. Their development, as yearlings, was greatly superior to the general run of animals in the district.

These preliminary experiments showed that animals could safely be carried on country topdressed with bluestone. Experiments on the effect of different levels of bluestone had meanwhile indicated that 5 lb. per acre was a suitable dressing, and accordingly this rate of topdressing was employed for the 1944 programme.

In the autumn and winter of 1944 the whole area of seven farms was topdressed with 5 lb. bluestone and 2 cwt. lime per acre. The hay paddocks on these farms had also been treated in the spring of 1943 with bluestone at 5 lb. per acre.

Results are only now becoming available, but are sufficiently encouraging to justify the recommendation that this method be utilised to control copper deficiency. The farms are situated on Piako Road, Gordonton, at Kerepeehi, Ngatea, Waitakaruru, and Pongakawa, so that a variety of districts has been covered. The only feasible method in all these cases was to allow the whole herd access to topdressed pasture. It was impossible to leave any untreated animals on the same farm, and comparison must, therefore, be made with previous experience and with the experience of neighbours in the same season.

On all of the farms treated scouring has been controlled, health and condition of adult stock have been very

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greatly improved, young stock developed remarkably well and have been reared to good yearling stage without removal from the farms, and butterfat production has been appreciably increased.

Accompanying photographs show the appearance of the herd and the yearlings on a topdressed farm.

Butterfat Production. — Comparison of butterfat production from year to year is complicated by such factors as food supply, which depends on season and stocking, number of cows carried, date of calving, and so forth.

The present season is the first for which butterfat production figures are available from herds which have been receiving regular supplies of copper since the previous autumn from topdressed pastures or from licks. Production figures can therefore be quoted only for the early spring months.

On two farms Herd Testing figures are available for the 1943-44 season and for the present season. From these results it has been possible to abstract the yields of 20 cows (the same in both years on each farm) which were in milk over approximately the same period in each year. In Table V the average 30-day yield of fat, month by month, for these 20 cows is shown for August to October in 1943 and 1944.

The spring of 1944 has been much better for production than the 1943 spring, and butterfat yields are higher. It is necessary to allow for this increase due to the better season in deciding what increase has resulted from copper topdressing. Therefore, the average yields that might, on the basis of previous performance, have been expected in 1944 from the same cows under the better seasonal conditions are shown in the column headed "expected yield in 1944." These expected yields have been calculated by applying to the 1943 returns a correction based on data supplied by the New Zealand Dairy Board showing the average increase in production in the appropriate month of 1944, compared with the same period in 1943, for the Herd Testing group in which the farm is situated. Though this seasonal difference is allowed for, it should be indicated that a better season for normal farms frequently means a worse season for "peat scours" farms, since a better growth of grass causes increased scouring.

TABLE V.—AVERAGE 30-DAY BUTTERFAT FROM 20 COWS.

Farm No.	Month.	1943.	Expected* 1944.	Actual 1944.	Average Age of Cows in 1944.
1.	August	23	26	32	6 years
	September	23	26	35	
	October	27	28	34	
2.	August	28	33	40	5 years
	September	28	33	36	
	October	32	35	36	

* Figure dervied by correcting the 1943 figure for seasonal variation in the manner shown in the text.

On both farms copper was supplied by topdressing with bluestone at the rate of 5 lb. per acre.

The figures in Table V give the most accurate assessment at present available of the effect of topdressing with copper on the production derived from copper-deficient farms. A clear-cut increase is demonstrated, but the picture is incomplete at the present stage and will be clear only when one or more whole season's figures are available.

Supplementary data are provided in Table VI concerning nine farms, two of which are those referred to in Table V. For Table VI only the dairy factory butterfat returns for August and September are available. It is realised that these figures are subject to wide fluctuations, particularly in the early months of the year, because of number of cows in milk, state of food supply, total carrying capacity, etc. Little can be done to allow for these variables, but it can be stated that the total number of cows in milk has not been materially altered; there has, for example, in no case been a change-over from sheep to dairy cattle, and general management methods have been the same in all seasons considered, except for the provision of copper. On all of the farms acute peat scours was controlled in 1943 by drenching, and in several herds, particularly herds 4 and 6, the drenching programme in 1943 was extensive. To allow for the effect of 1943 drenching the production figures for the corresponding months of 1942 have been included. Two figures for "expected production in 1944" are given, the one calculated from 1942 production and the second from 1943 production. The calculation has been made by applying a correction for seasonal variation in average monthly production per cow as shown by the New Zealand Dairy Board's Herd Testing figures for the appropriate testing group. The correction has been applied on a percentage basis, e.g., in a case where the group average 30-day fat was 28 lb. per cow for August, 1943, and 32 lb. per cow for August, 1944 (an increase of 14 per cent.), the actual production for August, 1943, has been increased by 14 per cent. in arriving at the expected 1944 production.

The figures in Table VI agree with those in Table V in showing that a material increase in butterfat production can be expected on farms affected with peat scours if copper is provided to the cows.

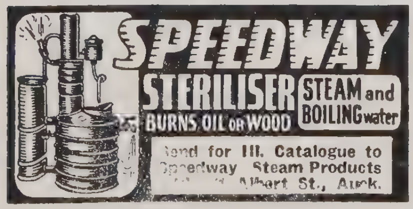
TABLE VI.

POUNDS BUTTERFAT FROM FACTORY RETURNS IN AUGUST AND SEPTEMBER.

Farm No.	Area Acres.	Total No. Cows.	Actual Production.		Expected Returns 1944*		Actual Production 1944.	Treatment in 1944.
			1942.	1943.	Calculated from 1942 Returns	Calculated from 1943 Returns		
1	125	60	1519	1717	1582	1880	2421	Topdressing
2	75	65	2023	2033	2077	2377	2778	,,
3	—	36	1377	1049	1435	1164	1640	,,
4	58	41	1076	1704	1095	2030	1897†	,,
5	58	40	1174	1238	1205	1473	2039	,,
6	88	60	921	1246	951	1458	1559	,,
7	150	95	1819	2039	1860	2392	2413	,,
8	50	40	1593	1372	1638	1626	1660	Lick
9	54	44	1267	1000	1299	1187	1495	,,

* These returns were arrived at from the actual 1942 and 1943 returns by correcting for seasonal variation in the manner described in the text.

† A "flare up" of mastitis in September, 1944, affected 60 per cent. of the cows.



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Sheep

A large-scale trial was conducted at Waitakaruru in 1943 on sheep, and in this case it was possible to provide adequate controls for comparison. One group of ewes was kept untreated, to a second group copper was provided by drenching 16 times during the gestation period, the ewes meanwhile running with the untreated animals, and a third group was kept on land topdressed with copper. All of the ewes were either reared on copper-deficient country or had been kept there continuously for at least five years, and the groups were so selected that similar ewes were evenly distributed in the three groups at the start.

Table VII summarises the results on lamb production and wool production.

TABLE VII.

Group.	No. of Ewes.	No. of Lambs. Docked.	No. of Lambs. Weaned.	Per cent. Lambs. Docked.	Per cent. Lambs. Weaned.	Avge. Fleece Weight from Ewes.	Average Value at Appraisal.
						lbs.	
Untreated ..	174	94	39	54.0	22.4	7.67	7/10
Drenched ..	113	100	99	88.5	87.7	8.79	9/6
Topdressed	115	116	116	100.9	100.9	9.01	9/11

Regular examination of blood from some of the ewes for copper and examination of livers of some ewes and of many lambs from each group proved that copper was actually absorbed in the cases where it was supplied.

The small number of lambs docked in the untreated group was not due to a low lambing percentage, but was the result of the many deaths which occurred between lambing and docking.

The comparison of 22 per cent. lambs weaned from untreated ewes with 88 and 101 per cent. in treated ewes illustrates very clearly the benefit conferred by provision of copper. The effect on financial return from the wool clip was by no means inconsiderable.

INDICATIONS FOR TREATMENT WITH COPPER.

There are a number of indications which may be considered by the individual farmer in reaching a conclusion as to whether or not his farm is deficient in copper and whether he should topdress with bluestone or supply copper in other ways to his stock.

General indications are:—

1. **Soil formation of farm. If it is peat, the probability of copper deficiency is high; similarly, there is a high probability of copper deficiency on peat pumice mixtures or peat sand mixtures. Not all peat formations are, however, deficient, and, conversely, copper deficiency on other soil formations is not excluded.**
2. **Locality of farm. This should be considered in the light of the areas defined earlier which are at present known to be deficient.**

On Dairy Farms

1. **The occurrence of peat scours in dairy cattle and yearlings. A useful confirmation can be obtained if scouring is stopped by drenching with bluestone.**
2. **Abnormally low production and unthriftiness of the herd.**
3. **Poor development or losses of young stock. It is desirable to exclude the possibility of internal parasites being the cause of losses in young stock.**

On Sheep Farms

1. **The occurrence in lambs of paralysis. The symptoms become more marked the longer the ewes are kept on the deficient country.**

Advice may be obtained from the local Government veterinarian, who will, if necessary, arrange for the examination of suitable specimens of liver as a final criterion of copper status.

It is a pleasure to acknowledge the co-operation and assistance received from the Government veterinarians at Hamilton, Messrs. J. Mullins, M.R.C.V.S., and H. Doyle, M.R.C.V.S., from the Lands and Survey Department at Kerepeehi, and from many farmers who have placed their stock and farms at my disposal. Amongst these farmers are Messrs. G. W. Walker, Piako Road, Gordonton; H. Wagstaff, Waitoa; R. S. Harvey, Kerepeehi; R. B. Hodgson and H. K. Fergusson, Ngatea; D. Dalgety, Pipiroa; and O. A. Cleaver, Pongakawa.

Rural Housing Scheme

Provision for Additional Rooms

WHERE an additional room or rooms is considered absolutely necessary, owing to family circumstances, the State Advances Corporation has decided that it will make such provision in the rural housing scheme published in the October issue of the "Journal."

The additions will be made only to types "D" and "E," that is, the permanent accommodation, and the following prices have been fixed by the Ministry of Works:—

Type "D": One extra bedroom (96 sq. ft.), £110; two extra bedrooms (192 sq. ft.), £220.

Type "E": One extra bedroom (172 sq. ft.), £198; two extra bedrooms (344 sq. ft.), £396.

Type "D" in the original plan, with two bedrooms, cost £980. With the addition of one and two bedrooms respectively the new prices would be £1090 and £1200.

Type "E," with two bedrooms in the original plan, cost £750. With the addition of one and two bedrooms respectively the prices would be £948 and £1,146.

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27 cub. ft. (3ft. x 3ft. x 3ft.) = 1 cub. yd.

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Jeeps Not Suitable for Farm Work

WHEN jeeps were a very familiar sight on New Zealand roads many people must have speculated on the uses to which these handy little vehicles could be put on farms when swords are again beaten into ploughshares. However, very little enthusiasm was shown for the jeep by a national committee on agricultural engineering which met recently in Ottawa at the invitation of the Canadian Department of Agriculture. The committee found that few military vehicles can be converted to farm use.

Experiments conducted with the jeep revealed that its transmission would not stand up if burdened with more than a four-horse load. While the jeep's drawbar pull varied with load and terrain, it was not likely to replace that of the tractor. The jeep's speed was too fast for farm work, and even when throttled it had not sufficient power. Its transmission, like that of most war vehicles, was designed especially for military use and not to run continuously in low gear.

Sprays

for combating the commoner insect pests and fungus blights in the home orchard are contained in Bulletin 77, available *free* from offices of the Department of Agriculture. All the pests likely to trouble the amateur orchardist are described and guidance given on spray equipment and the maintenance of healthy trees, the basis of an assurance of profitable returns.

NEW ZEALAND'S BEST SELLER!

Purely as a matter of courtesy, and as a publisher, I sent free of charge and with my compliments, a copy of my book, "THE AWAKENING," to the different Newspapers and Journals throughout New Zealand. So far, it appears that only a few have had the necessary space to review the book.

However, hereunder, I give you an excerpt from the leading article appearing in the "North Wairarapa Herald" of November 3rd:—

"THE AWAKENING"

"An American ex-agricultural instructor, Edward H. Faulkner, in July of last year, published 'Plowman's Folly,' and the startling nature of the views expressed by Mr. Faulkner evinced so much interest that up to March of this year, eight editions had gone to the book stalls. Mr. Faulkner's views have been held for some time by Mr. Alister Bevin, an agricultural implement manufacturer, of Auckland, who has made an intelligent study of agricultural science and practice over many years. Mr. Bevin has also written a book entitled "The Awakening," and although he says that he is concerned with the practical side of farming rather than with the scientific aspect, he has displayed a sound knowledge of the theory of his subject. The Auckland writer is most convincing in his advocacy of rational surface or top-soil cultivation, and although he modestly disclaims ability to write well, he can hold the attention and arouse the interest with his common-sense arguments. We believe that every primary producer throughout the Dominion should read, discuss and digest "The Awakening." Many will assert that as a manufacturer of harrows the author has an axe to grind. We are convinced that he is more sincere in his advocacy."

Actually, it now appears that "THE AWAKENING" is a darn good book. I have had letters from all over the country *from those who have read it.*

One chappie says: "I think it's worth double the price." If you know the farmers as well as I do, you'll agree that this is certainly "some" testimonial.

Another says: "I am in complete agreement" . . . Another writes: "Your book has certainly been an 'Awakening' for me." A Director of one of the biggest firms in New Zealand, doing business with farmers, gardeners, etc., said: "Whether you are aware of it or not, I don't know, but nevertheless your book is going to have a great bearing on the future of agriculture in New Zealand."

Yet another writes: "I think that any person working on the land would be well advised to purchase a copy of your book."

Well, I've got scores more of similar opinions, so I conclude "THE AWAKENING" must be all right—certainly worth the 2/6 Postal Note (or stamps) you will send with the attached Coupon—many thanks!

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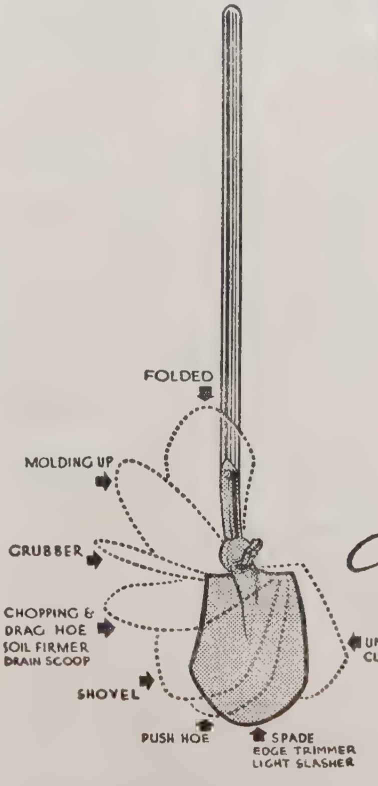
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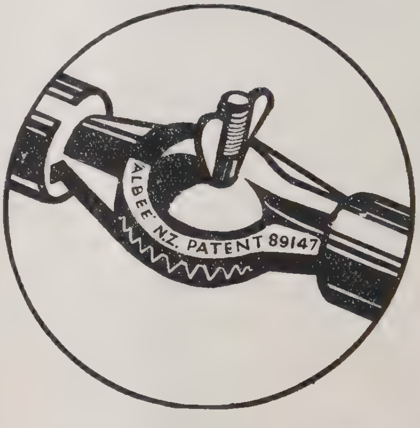

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Pig Management

Good Breeding Stock Main Essential of Good Grading

THE influence of breeding from good parents is much greater than most producers realise. Commercial type is fundamentally bound up with breeding, and while unsuitable feeding and bad management conditions may affect the conformation of pigs whose parents are of good type, faulty conformation due to poor parent stock cannot be corrected by good feeding.

By
H. M. PEIRSON,
Superintendent of the Pig Industry, Wellington.

BREEDING from good stock is one of the major factors in obtaining economic returns. Mongrel-bred stock cannot be relied upon to produce the uniformity necessary to give a high average grading, and this is very important, especially as in post-war trade New Zealand will have to meet the competition of countries which have had an opportunity of building up their exports of pig-meats to the United Kingdom.

Many are prejudiced against the use of pure-bred stock for the production of commercial pigs, as they believe that pigs of mixed breeding are more healthy and grow more vigorously. While this may be true in some cases of first crosses, it most certainly is not so with mongrel pigs. The carcase quality scheme and baconer competitions conducted in New Zealand over the past 6 years provide ample evidence that this belief is without foundation.

It can be said, of course, that certain strains of pure-breds do not compare favourably with crossbreds from the viewpoint of vigour, but in most cases this can be attributed to in-breeding by an inexperienced breeder and poor breeding conditions.

Adjustments in breeding are essential to quality, and producers who are breeding from mongrel sows will profit through replacing these with carefully-selected pure-breds. The pig club movement was instituted with this objective, and has been responsible for the elimination of many of the mongrel sows in commercial herds.

The production of first crosses will no doubt continue to hold favour, and there is much to be said in favour of this policy. There is a tendency, however, for producers to select a first-cross sow and mate again to a different breed. By following this policy the hazard confronting the producer lies in the danger of losing some of the improvement, and ultimately reverting to mongrel pigs. The first-cross sow is usually very prolific and an excellent mother, and while the three-quarter-bred offspring are not likely to be less uniform in quality than the first cross, it is unwise to depart from a breeding policy within two breeds. There is, however, much to be said in favour of producing pure-breds only. Grading results are not so likely to differ from litter to litter, and if the pigs produced are of the same breed or a first cross, the producer is provided with the best possible means of improving the average grading of the herd.

The Stock Boar

During the past 10 years grading results of commercial pigs in New Zealand have improved considerably. This has been very largely due to the introduction of more pedigree boars. There are still, however, far too many boars in general use today belonging to the scrub category, and their influence is a definite menace to the pig industry. Observations made by those who are really interested in the progress of the pig industry show to what extent an inferior boar can affect economic production. An inferior boar is costly at any price.

It has been observed that the progeny of different boars used in the same herd have given widely different results. Particularly is this noticeable in respect to their influence on the grading of their offspring. A boar of correct conformation and good breeding can be expected to sire progeny which will grade better than that of an inferior boar.

If two such boars during the course of their respective breeding lives are responsible for producing 400 pigs each, which are marketed at an average carcase weight of 140lb., then the net difference in returns from the two sets of progeny due to grading only, at present schedule price, would amount to £100. While this may be considered an exaggerated example, the grading down of only a few of the progeny represents a potential loss that would more than cover the higher price paid for a really good boar.

It is probable also that the progeny of the superior boar will prove more

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with the
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TO-DAY

economical as a converter of feed into pig-meat in so far as the progeny of a well-bred boar will reach marketable weights earlier.

These factors taken into consideration, it is surprising that, as a general rule, producers are not prepared to pay more than the price of a good baconer for the sire of the herd. It can be fairly stated that few boars bought for less than double this price are good investments to their purchasers, and every producer who is using a scrub boar should allow himself to be convinced that the extra cost of acquiring a better sire is a good investment.

Uniformity of carcase conformation can be most easily acquired by using good breeding stock. Good conformation and type are fixed with more certainty in pure-bred stock than in mixed crossbred and mongrel pigs.

If the acquisition of good breeding stock needed any further recommendation, then the imagined advantages of keeping mongrel pigs are more than outweighed by the national good that would arise from being in a position to supply the post-war market with a uniform article.

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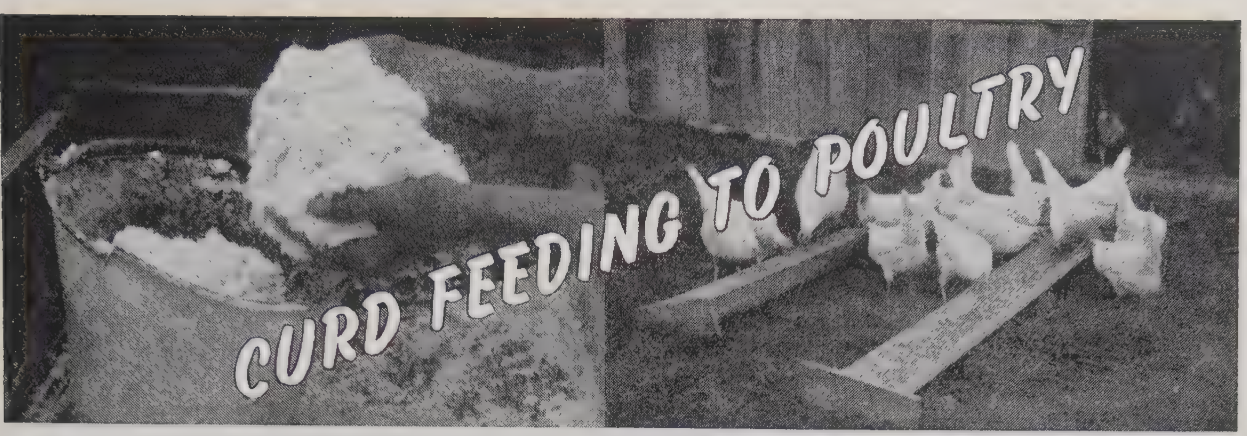

CURD FEEDING TO POULTRY

Most of the eggs produced in New Zealand come from farms which regard poultry-keeping as a side-line, and on many of these farms separated milk is available. What is the most profitable way of using separated milk? This article, by E. R. Marryatt, formerly technician at the Ruakura Animal Research Station and now serving overseas, is reprinted in response to numerous inquiries. It summarises the results obtained in the first two years of a trial carried out at the station to investigate the economics of feeding curd to poultry and to demonstrate that curd feeding to poultry is a satisfactory alternative or adjunct to pig-keeping on dairy farms and perhaps offers employment for women.

THE object of curd feeding to poultry is to reduce to the minimum the amount of purchased foods used. Separated milk contains only about 10 per cent. of dry matter, but drained curd contains about 20 per cent of dry matter, so that the birds get twice as much food from eating the same weight of drained curd as from separated milk. The dry matter of separated milk, moreover, is mainly protein, milk sugar and ash, but the dry matter of drained curd is mainly protein, for most of the milk-sugar and ash have been removed in the whey, which is therefore valuable for feeding to pigs along with other foods.

Because drained curd is a protein-rich food, some food rich in carbohydrates should be fed with it. Maize is suitable for this purpose, as about 70 per cent. of its dry matter is starch.

Making the Curds

The preparation of curd and the details of feeding the poultry in this experiment at Ruakura were arranged by Mr. E. C. Jarrett, Poultry Instructor, Department of Agriculture, Auckland, and he supervised the management of the flock from the beginning. The separated milk curdles in wooden barrels (Figs. 1 and 2), which are housed in a wooden box (Figs. 2 and 3) to maintain the temperature of the curdling milk.

Most rapid curdling takes place when the milk is kept warm, so that it is best to pour the milk into the barrels while it is still warm after separating. In cold weather the temperature inside the box can be maintained by lighting a hurricane lamp and placing it inside the box between the barrels. Some soured milk or some whey may be used as a starter when curdling is first started, but the small amount of whey left in the barrels thereafter is sufficient to maintain curdling.

When a good hard curd has formed sufficient for at least the following day's feeding is put into a draining box to dry. The draining box (Figs. 2 3 4, and 5) is 2ft. by 4ft., and 9in. deep with a sloping V-shaped bottom, like a cheese vat (Fig. 5), and with a plug at the lower end. The box is in the open to allow wind access and is covered with a removable and ridged roof to keep out rain and animals. The triangular ends of this cover are fitted with bird-netting to let the air circulate. Wire-netting is sufficient cover in fine weather, and the lid at Ruakura has been adapted so that it can readily be changed from wire-netting cover to an iron one. The curd is placed at the raised end of the box so that the whey may drain off into a receptacle, where it is collected for the pigs.

The original feeding programme laid down by Mr. Jarrett was:—

From September to March:

"Feed practically all curd; the mixture to consist in parts by measure of:—

Curd, 4 to 5 parts.
Pollard, 1 part.
Maize-meal, 1-3 part.
Green-feed (chopped), 1½ to 2 parts.

"This mixture is to be put in the troughs at 8 a.m. The troughs are to be filled fairly full, and the birds kept inside the house until they have eaten their fill. Then let them out, but allow them to come back for more. The quantity should be as much as will be eaten so that nothing is left by the following morning. At night the birds are to be allowed ½ oz. of grain (wheat and maize) each in the litter.

From March to September:

"As the curd goes off increase the pollard and maize-meal and add meat-meal; morning mash with no curd will consist of 5 parts of pollard, 2½ parts of bran, 1 to 1½ parts of maize-meal, and 1½ to 2 parts of meat-meal. Allow 1 oz. (or 1¾ oz. if necessary) of grain in the evening.

"Poultry fed on curd may scour, and a lime solution should be poured over the curd. Make a lime paste with 2 lb. of rock lime and 1¼ quarts of water

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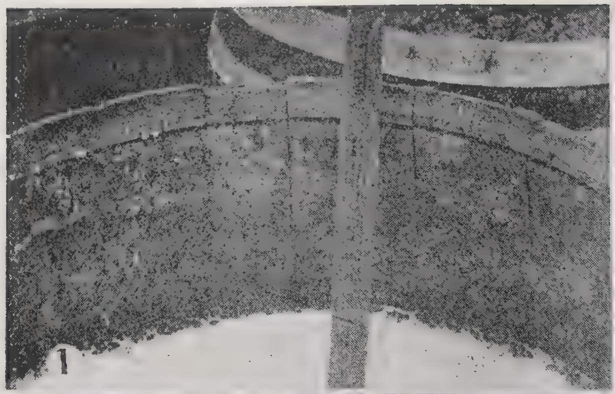
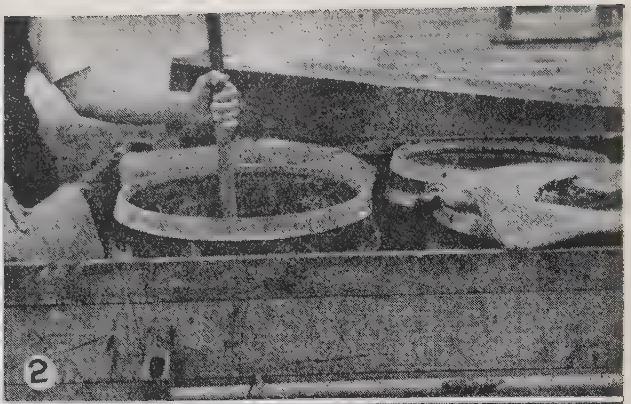
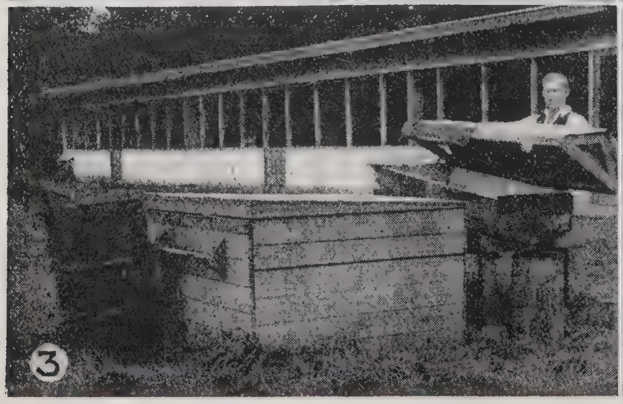






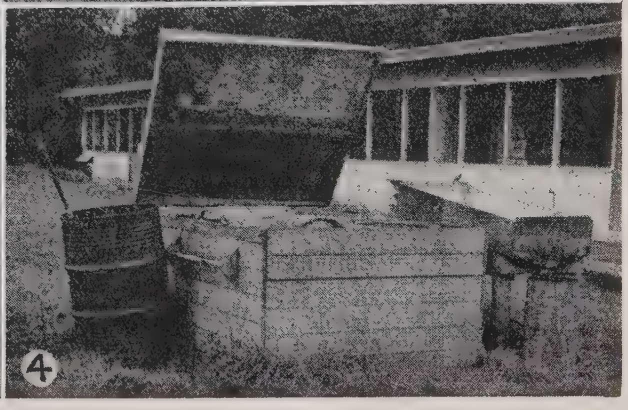


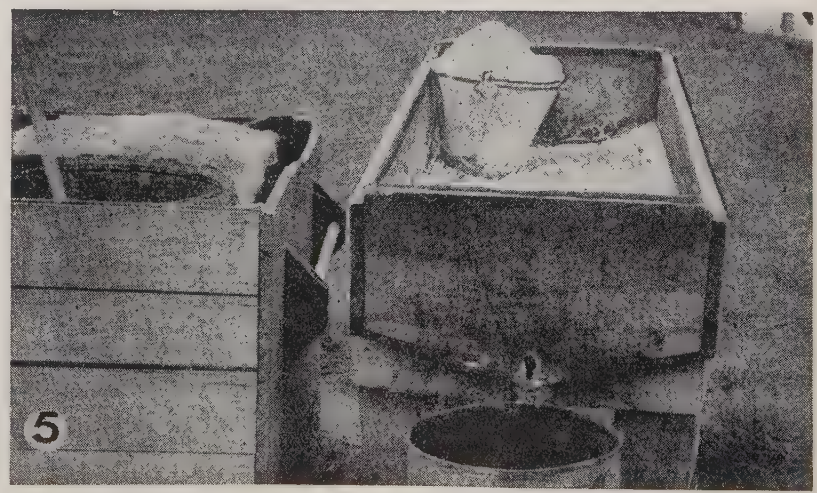
Fig. 1—The separated milk being measured with a dip-stick in the barrels where curdling takes place.

Fig. 2—Similar to Fig. 1, but also showing the arrangement of the barrels in the heat-retaining box and the inclined curd-draining box in the background.

Fig. 3—Whey-drum on left; covered box for barrels in centre; cover being removed from curd-draining box on right.

Fig. 4—Lid being taken off the box which protects the barrels.

Fig. 5—A close-up of curd-draining box.



and add a tablespoonful of the paste to a gallon of water. Pour this over the curd."

The lime solution was used only once and no serious scouring occurred.

Chaffed grass was always included in the morning mash, and the birds ate all of it, although they had a free range on grass pastures. The value of this chaffed grass to the birds is not known. Figs. 6 and 7 show the method of chaffing the grass and what it looks like when chaffed. Prairie grass was being used at the time these photographs were taken.

Valuation of Birds

The trial started on April 1, 1938, with 120 White Leghorn birds, consisting of 22 hens and 98 pullets, which were hatched on October 19, 1937. During 1938-39 51 birds were culled and 14 died. On April 1, 1938, the flock was valued at £42 5s., and on March 31, 1939, at £13 15s. Culls brought £5 10s. 6d., so that the reduction in value of the flock for the year was £22 19s. 6d.

On April 1, 1939, the flock consisted of 55 hens and 73 pullets, which were hatched on September 21, 1938. During 1939-40 nine hens and 16 pullets died, and eleven pullets were culled. On April 1, 1939, the flock was valued at £41 2s. 6d., and on March 31, 1940, at £22. Culls brought £1 4s., so that the reduction in value of the flock for the year was £17 18s. 6d.

Curd and Purchased Food

The object of curd feeding to poultry is to reduce to the minimum the amount of purchased food used. The separated milk for curd feeding was supplied from a herd of 10 cows grazed on the feed flavour investiga-

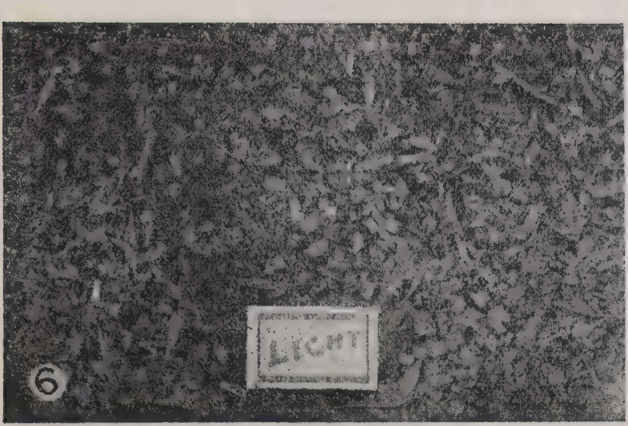


Fig. 6—A close-up of the chaffed grass.

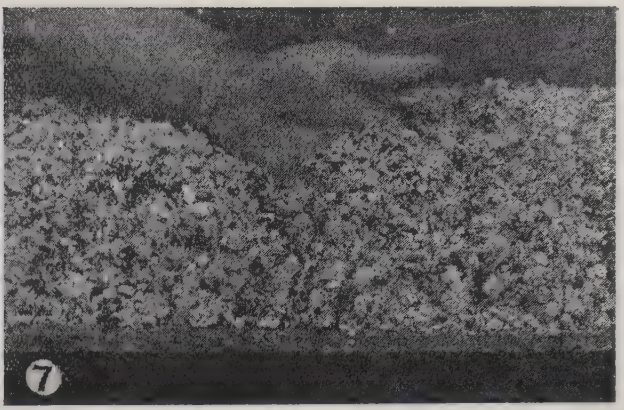


Fig. 7—The morning-mash consisting of mixed meals, drained curd and chopped grass ready for the birds.

tion section at Ruakura, and this herd did not supply quite enough separated milk for the purchased foods to be reduced to the absolute minimum. Reviewing the work of the two seasons, a satisfactory proportion would be 12 to 15 cows for every 100 birds kept.

The landed cost of purchased foods for the 1938-39 season was £51 14s. 11d. and for the 1939-40 season £61 1s. 9d. The quantities of purchased food and curd consumed are as follows:—

Mean number of birds	111	117
Meals	12,430lb.	7,195lb.
Curd	12,430lb.	8,682lb.
Grain	3,828lb.	2,797lb.

Separated milk may be expected to supply from 17 to 28 per cent. of its weight in drained curd, and from 60 to 69 per cent. of its weight in whey. A loss in weight of 5 to 16 per cent. will occur. Stated more generally, separated milk may be expected to produce curd to about one-quarter of its weight and whey to about two-thirds of its weight. The whey secured in this trial was used for pig feeding.

Egg Production

In the 1938-39 season 20,119 eggs were produced, realising £130 4s. 9d. net, or 1s. 6½d. per dozen, and in the 1939-40 season 20,371 eggs realising £154 8s. 2½d. net, or 1s. 10½d. per dozen. In the former season the pullets did not begin to lay until the end of April, while in the latter season the pullets were hatched a month earlier and began to lay in late February. In the 1938-39 season 13 per cent. of the eggs produced were laid in the first quarter, and in the 1939-40 season 22 per cent. Thus, the returns for the second season benefited from the high winter egg prices.

In the 1938-39 season the net income (receipts for eggs less cost of purchased foods and reduction in value of the flock) was £55 10s. 4d., and in the 1939-40 season £75 7s. 11½d. This is a return of £5 11s. per cow in the former season, and £7 10s. 9d. in the latter, and compares very favourably with pig-keeping. The production of a baconer per cow is looked on as a very high standard of pig-production on dairy farms, and gives a gross return of £3 15s. to £4 per cow. The production of a baconer requires from 750 to 800 feed units; separated milk will supply only 500 units, and the rest must be provided by purchased or farm-grown foods.

An alternative comparison may be made by comparing the value of a gallon of separated milk for pig and poultry feeding. M. J. Scott in his "Results of Pig Census," which appeared in the "Journal" for November and December, 1938, and January, February, March and April, 1939, gives the earning value of one gallon of separated milk for pig feeding as ranging from 0.31d. to 1.96d. These values were estimated from information supplied by 182 farmers from all over New Zealand for the year ended April 30, 1938. No allowance was made for labour or depreciation on buildings or stock.

On the same basis the earning value of one gallon of separated milk when fed as curd to poultry in the 1938-39 season was 3.7d. when the whey was not used, and 4.0d. when the whey was used for pig-feeding and valued at ½d. per gallon. Allowing for the depreciation in the value of the flock, one gallon of separated milk was worth 2.6d. as curd for poultry feeding and 2.9d. as curd for poultry and whey for pigs. In the 1939-40 season, with the higher average price for eggs and with less milk used, even better results were secured.

This comparison of pig and poultry-keeping as side-lines on dairy farms shows that poultry-keeping offers an alternative to pig-keeping, and at present may be made a more profitable enterprise.

All photographs are by the author.

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Pig Industry Broadcasts

UNDER the auspices of District Pig Councils broadcasts will be delivered in January as follows:—

Auckland—1YA, on January 17, at 7.15 p.m., "The Selection and Care of Breeding Stock," by F. Barwell, Supervisor, Bay of Plenty District Pig Council.

Wellington—2YA, on January 16, at 7.15 p.m., "Maintenance of Lay-out," by C. H. M. Sorensen, Supervisor, Taranaki District Pig Council.

Christchurch—3YA, on January 18, at 7.15 p.m., "Production of Pig-meat without Dairy By-products," by H. McIntosh, Supervisor, Canterbury District Pig Council.

Napier—2YH, on January 11, at 7.15 p.m., "The Origin and History of the Breeds of Pigs in New Zealand," by I. H. Owtram, Supervisor, Tairawhiti District Pig Council.

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Gestation Table

Mares ..	340	days from date of service
Cows ..	283	" " " " "
Ewes ..	150	" " " " "
Sows ..	116	" " " " "
Bitches .	63	" " " " "
Rabbits	28-30	" " " " "

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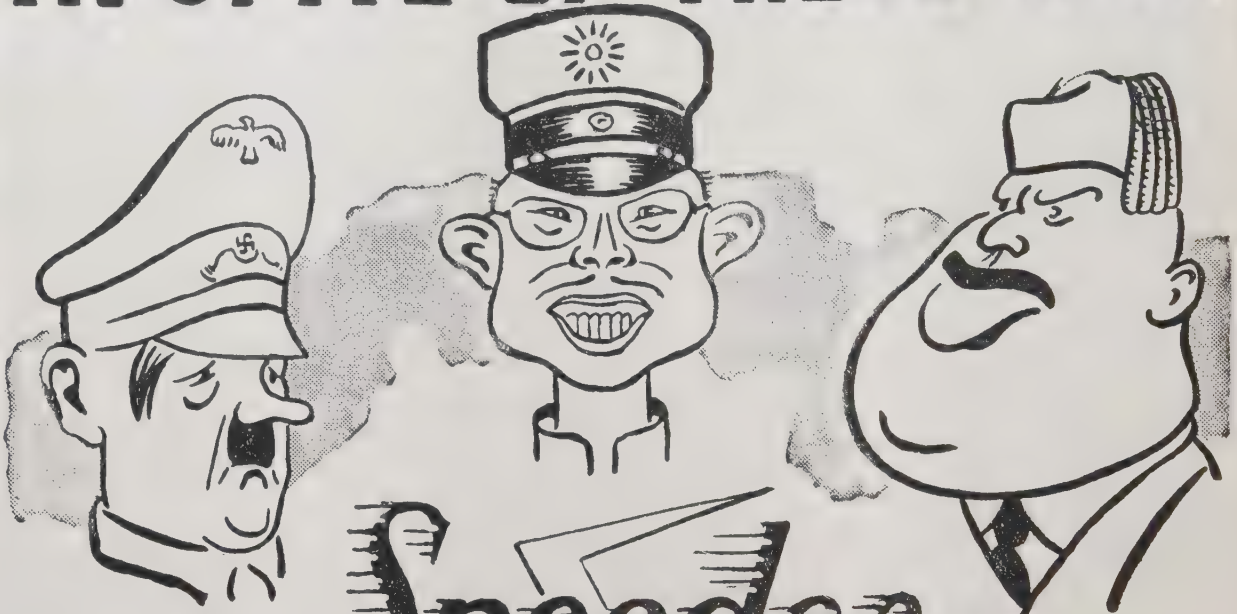

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Causes of Excessive Wastage in Pig Industry

Consideration of slaughtering and inspection figures over the past season emphasises the loss through condemnation of pig carcases or their rejection for export, which represents a serious loss to the farmers and to the country. It is, however, only a portion of the wastage in the industry.

— By —

D. MARSHALL,
District Superintendent,
Livestock Division, Wellington

MR. H. M. PEIRSON, when recording officer of the Waikato Pig Recording and Research Association, in his annual report stated:—"A mortality of 22 per cent. had to be recorded between birth and weaning. The greatest percentage of deaths has been recorded as 'born dead,' which is not actually the case. Had someone been in attendance at the time of farrowing, the death-rate would have been reduced very considerably, as in many cases the pigs born (alive) died of suffocation." This is in recorded herds where the recording officer is advocating the value of management and attention at farrowing, and where owners take more than average interest in their pigs . The loss at this period may well be greater over all herds.

Some of the farm loss through pigs being born prematurely, or imperfectly developed, or dead, is undoubtedly due to defective feeding of the pregnant sow. Successful breeders have shown that the supposed danger of sows being "too fat at farrowing" does not arise if the sow is active and healthy. As in the case of other stock, pigs provide evidence that better feeding of the pregnant mother results in heavier young being born. On the other hand, pregnant sows underfed, either through lack of green feed in dry autumn periods or poor-quality herbage and no supplement, such as meat-meal and roots or milk, during the winter, are more liable to the above losses.

Loss After Weaning

Further wastage occurs between 8 and 12 weeks. This appears to be one of the most susceptible periods of the pig's life. It follows directly on weaning, and unless the creep system or other method has been developed to make the change from mother's milk less of a shock, and unless care and conditions at this stage are good, the pig suffers from the change in diet, it has frequently to contend with older pigs at feeding, and is exposed to the hazards of overcrowding and dirt. Even if the pig survives this period, under bad conditions it may contract some infection which, while not fatal, renders its carcass at a later stage unexportable or even unfit for consumption.

Fawcett, in a statistical survey of the position for 1934, estimated by a comparison of the number of pigs that should have been available for slaughter with those actually put through that there was a discrepancy of 125,000, or, in other words, a death-rate of 125,000 pigs.

Bacillus suipestifer infection is an important bacterial factor in the mortality of the 8 to 12 weeks period and will be dealt with later.

Causes of Condemnation and Rejection

The following are the chief causes of condemnation and rejection: Tuberculosis, pleurisy, peritonitis, septic wounds, faulty castration, arthritis, nephritis, bruises, and skin lesions. It should be emphasised that, with the possible exception of tuberculosis, all are the results of defective management and are to that extent preventable.

McIlwaine, in this journal, October, 1935, wrote, "There is no doubt whatever that if greater attention is paid to the cardinal matters—improved housing, feeding, and improved conditions—the alarming mortality in young pigs would be reduced to reasonable proportions." To quote again H. M. Peirson, "The more pig recording is extended the more definite has it become that management is the biggest factor in successful pig-keeping. . . . It is still unsatisfactory to find that the pig is the first animal to be neglected on the farm. At haymaking and holiday-time the weights of many litters show a considerable decline." What are the reasons for this? One might suggest failure to recognise the extent of loss and the value of housing and hygiene, overwork, and lack of sufficient time to attend to pigs, or a method of pig-farming not suited to the soil type and locality. Success in pig-farming is usually under one of the following conditions: Locality highly suitable with dry subsoil, sunny aspect, and abundant natural shelter, plant big enough to employ one or more men the whole time, or else the owner or one of his staff keenly interested in pigs and able to take the time necessary to attend to them.

Tuberculosis

The most common source of tuberculosis is undoubtedly infected skim-milk. Other ways of infection are grazing after infective cows, association with other pigs in an advanced stage of the disease, or with tuberculous poultry, or possibly from a diseased mother. Bad housing, sanitation, and management cannot themselves cause the disease, but may be responsible for its spread and for its more rapid development in any pig once infected.

Visible signs of the presence of tuberculosis in the pig are not common. Detection of every possible infectious cow in the herd is not easy without the use of the tuberculin test. Infections from this source could be lessened, however, were farmers to familiarise themselves with the suspicious signs, and promptly to report to their inspector of stock any cows showing these. They are:—

1. **Tuberculosis of the lungs: Loss of condition and chronic cough, the cough being manifested after exertion.**

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2. **Tuberculosis of the throat-glands with peculiar carriage of head, abnormal "roar" in breathing, or swelling at throat.**
3. **Swelling of any superficial lymphatic gland, the three chief being below ear, front of shoulder, and fold of flank.**
4. **Tuberculous mammitis: Gradual increase in size and hardness of one quarter of the udder without previous acute inflammatory stage of ordinary mammitis.**

Pleurisy

Pleurisy is inflammation of the normally smooth and thin membrane lining the inside of the chest and also covering the lungs. The condition found in slaughtered animals is usually a thickening of the membrane as a result of a previous acute attack of pleurisy. If thickened, the membrane must be stripped off, and the British authorities will not accept carcasses from which the pleura has been removed. Cases condemned are those in which the inflammation is still in the acute and fevered stage or septic fluid is present in the chest.

Practically all cases of pleurisy are associated with some degree of pneumonia, the symptoms of which we recognise in the piggery. Numerous specimens of lung from pigs found with pleurisy in slaughterhouses have been examined at the veterinary laboratory at Wallaceville, and in a large percentage pasteurella organisms, believed to cause swine plague or infectious pneumonia, have been found.

Pasteurellosis, therefore, becomes of importance not only on account of the mortality it causes, but also because of the ill effects (in the form of a thickened pleural membrane) left behind in recovered cases. According to one authority, the infection is more widely spread than the disease, suggesting that certain pigs may carry the infection without suffering.

Factors lowering vitality and rendering pigs susceptible thus become of importance, and these are poor housing, lack of shelter to runs, dirt, and overcrowding. Pasteurellosis may be introduced into a piggery by purchased pigs, hence the importance of isolating these for 10 days.

Symptoms are cough, discharge from nose, watering of eyes, together with hurried jerky breathing. Condition may be lost, and deaths occur; occasionally pigs over a fairly wide age range and up to the heavy porker are affected. The trouble should be treated by isolating affected pigs and feeding light laxative diet including molasses and cod-liver oil, teaspoonful daily, in milk. It is advisable to spray houses and bedding with creosote and oil.

During the past season regular reports have been made by the meat inspectors on all lines of pigs in which the percentage of tuberculosis or pleurisy has been unduly high. These have been referred by the district superintendent to the inspector of stock in the district concerned so that conditions on the farm could be noted and advice given if necessary. The following are extracts from reports of Mr. E. A. McKinlay, inspector of stock for Hamilton, on some of the many farms visited, pleurisy up to 16 per cent. to 20 per cent. having been found in pigs raised on them: 1. Stores had been run in the open without houses for a time during a period of wet, cold weather; 2. conditions very bad, poor draughty houses, pigs sleeping mostly in the open under trees; 3. one small house, many sleep in the open; 4. unsatisfactory, no house or shelter; 5. house raised on piles and draughty, piggery exposed; 6. heavy wet land, houses draughty, runs small and dirty.

In other instances conditions were good, but pigs had been bought at sales and seeds of disease already sown. It has been felt that feeding

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is an important factor in disease control, particularly more complete feeding of the younger pigs, sufficient starchy foods in winter, and mineral supply. However, amongst those pig-farming successfully there is a wide diversity in feeding, including skim alone, whey and meat-meal, maize and roots, extensive grazing, and sty-feeding. The above reports suggest that poor housing and lack of shelter are two of the most important factors leading to excessive pleurisy.

Pigs can be reared free from pleurisy. A recent experiment at Ruakura, carried out by the Fields Division to test certain feeding methods, concerned 30 pigs. These were raised to the eight-weeks stage on a standard milk-meal ration and thereafter run in different lots under different conditions of feed and management. Housing mostly was not elaborate, but draught-proof and floored. Paddocks or pens were reasonably sheltered and clean—used for pigs for the first time 12 months previously. Feeding was of various types after eight weeks, but milk and meal were fed at regular hours and in measured amounts. No cases of pleurisy were found on slaughter.

In a second instance, out of 120 pigs put through only three were found to have pleurisy. The owner here was an enthusiast and a great believer in good housing and the value of bedding, which was changed daily and sometimes twice daily. The three pleurisy cases were believed to be three pigs which refused to sleep inside.

Prevention of Pleurisy

Prevention of pleurisy therefore appears to depend on attention to the following points:—

Housing.—The house might be tight-walled to be free from draughts, but ventilated below the roof, and have a wooden floor; felt or wood beneath an iron roof keeps it warmer in winter and cooler in summer. Designs for houses are readily available. Provision of a concreted yard in front of the house is useful, particularly in wet country, as pigs may be confined to the house and yard during very wet weather. Proper provision of **drainage** from the yard is essential to keep surroundings clean.

Shelter.—For the runs where the pen system is followed shelter is perhaps even more important for pigs than for other classes of stock. Outbreaks of disease, and in pigs under record a marked check in rate-of-weight increase, have been frequently observed during spells of cold southerly weather where housing and feeding were satisfactory but runs were badly exposed to bleak winds.

Shelter may take the form of artificial barricades of wood, iron, or scrub on windward side of runs or suitably close live hedges. Pampas requires fencing till established, but when mature makes a dense mass which is almost a substitute for a house.

Other points are cleanliness, avoidance of overcrowding, regular feeding, adjustment of amount of food to rate of growth, change of run where necessary, and the various other points summed up under the term "good management."

Peritonitis

Peritonitis is inflammation of the membrane lining the belly-cavity, and covering the intestines and other abdominal organs. As seen at the works, it resembles pleurisy in that many cases show only the thickening of the membrane resulting from a previous acute attack, but "stripping" is necessary. The percentage of peritonitis was higher than usual last autumn, probably as a result of the wet summer. In the field it is frequently found associated with Salmonella suipestifer infection, and preventive measures will be dealt with under that head. It may follow post-castration infection.

Nephritis is inflammation of the kidneys, acute or chronic. Bacterial infections, including suipestifer, have played a part.

Arthritis, an inflammation of a joint, frequently the stifle, with excess discoloured synovia present, is also in many cases due to an infection, suipestifer having been found in some. A percentage of cases may be set up by bruising of the joint, possibly through climbing up on to feeding-platforms.

Important Factor

Infection by Salmonella suipestifer is thus apparently an important factor in the production of the three previously named lesions, but it is also one of the chief causes of mortality in young pigs.

In suckers it is one cause of scours, if houses are contaminated and conditions dirty. In older pigs pneumonia is often present, evidenced by jerky breathing and loss of condition. Bowel lesions are also common, either with pneumonia or independently, varying from small ulcers to extensive thickening—the so-called necrotic enteritis. The symptoms of this are usually chronic scour, marked loss of condition, pigs becoming skinny. Peritonitis is nearly always found in such cases. Deaths from a very acute infection may occur before the above signs develop, dead pigs often showing blue discoloration of belly and thighs ("blue belly"). The feature of suipestifer infection is the periodic occurrence of deaths, and the presence of odd, skinny, unthrifty pigs showing the above symptoms. It is largely a dirt-disease, and infection becomes active where resistance is lowered.

Prevention and Control

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especially at feeding-places, change of runs if the ones in use are old and contaminated, and avoidance of overcrowding, which is a potent cause of spread. The obviously unthrifty pig which is merely distributing infection should be destroyed. Thoroughly clean out all milk containers, add some lime, and for a period a daily amount of chlorine disinfectant—say, a teaspoonful per 40 gallons. Feed a little whole milk to small pigs; cod-liver oil is useful. Access to good grazing often helps. Give necessary attention to housing. Small doses of sulphate of iron solution to suckers will check scouring.

Faulty Castration

Castration is a surgical operation, incision being made into clean healthy tissue, and healing should be rapid and uneventful. Occurrence of large tumour-like swellings points to infection. Castration should be carried out at an early age, and Waikato Recording Association pigs are usually castrated at three weeks old. It is essential that pigs should be clean when operated on, and imperative that for 10 days afterwards they should be kept strictly clean, either confined to a clean house or preferably in a clean grass run, with clean house and feeding-space available. Do not apply strong antiseptics on or in the wound, and rather use an antiseptic on the skin before operation, preferably tincture of iodine.

Septic Wounds

Septic wounds are the result of infection by dirt organisms of any wound or scratch. They may occur on any part of the body or limbs; about joints they may cause severe lameness. The infection may attack gums and lips of suckers. Many respond to treatment by first scrubbing the sore well to remove dead tissue, and then dusting with tartar emetic. Repeat in a week. If in the mouth, swab with iodine.

Overcrowding at feeding places, quarrelsome pigs, excess barbed wire all tend to cause wounds, and filth harbours the infection. One may see such cases occasionally where pigs have quite a clean range on grass but come into some filthy pen for milk.

Summary

Much of the loss due to the presence of tuberculosis in pig carcasses could be prevented by more prompt detection and elimination of the dangerous cow in the dairy herd.

Condemnations and rejections for pleurisy, peritonitis, faulty castrations, and septic wounds could be lessened, and pig mortality on the farm reduced by attention to the following matters: Good draught-proof housing, with sufficient accommodation for all pigs and bedding in cold seasons; clean runs and feeding places; correct feeding, particularly of the pregnant sow, and of the litter and weaner, along the lines developed by recording clubs; adequate shelter for pens or runs; avoidance of overcrowding either in houses, in runs, or at feeding places; temporary isolation of all newly-bought pigs.

Good management comprises all the above matters, and also includes that little measure of interest in the pigs and attention to detail without which the best of layouts may fail.

◆

Bushel Measure

The imperial bushel introduced in 1826 is a measure of capacity, not of weight, although now it is common trade practice to buy and sell grains, some feeding stuffs, and ryegrass seed according to an accepted reckoned bushel weight, rather than by a capacity measure. The imperial bushel has a capacity of 2,218.2 cub. in., which is the volume occupied by 8 imperial gallons or 32 quarts.

Accordingly a 4-gal. petrol tin makes a useful ½ bushel measure, while the standard bushel apple case 18in. x 11½in. x 10¾in., the volumetric measure of which is 2,225 cub. in., contains for all practical purposes one bushel.

Slaughterings of Stock

THE following returns of slaughterings of stock at meat-export slaughterhouses and abattoirs for the months May-October, 1944, have been compiled by the Livestock Division:—

District.	Cattle	Calves	Sheep	Of which Ewes were	Lambs	Pigs
North Island.						
Meat-export Slaughterhouses—						
Auckland	96,581	509,883	124,734	67,657	166,908	101,288
Poverty Bay-Hawke's Bay	30,187	42,948	215,312	114,969	253,150	11,352
Taranaki-Manawatu ..	43,131	187,275	90,229	56,818	217,560	46,046
Wairarapa-Wellington ..	17,429	17,246	94,079	43,937	153,973	9,984
Totals	187,328	757,352	524,354	283,381	791,591	168,670
Abattoirs	61,154	17,392	289,484	96,660	37,132	21,061
North Island Totals ..	248,482	774,744	813,838	380,041	828,723	189,731
South Island.						
Meat-export Slaughterhouses—						
Nelson-Marlborough ..	1,135	9,774	7,441	5,249	49,247	5,222
Canterbury	7,513	29,164	185,037	163,196	591,659	14,554
Otago-Southland	7,727	30,259	149,598	135,619	723,838	2,520
Totals	16,375	69,197	342,076	304,064	1,364,744	22,296
Abattoirs	26,790	4,574	131,190	73,776	14,684	6,159
South Island Totals ..	43,165	73,771	473,266	377,840	1,379,428	28,455
Dominion.						
Meat-expt. Slaughterhouses	203,703	826,549	866,430	587,445	2,156,335	190,966
Abattoirs	87,944	21,966	420,674	170,436	51,816	27,220
Grand Totals	291,647	848,515	1,287,104	757,881	2,208,151	218,186
Same Period, 1943— Meat-export Slaughterhouses and Abattoirs ..	293,746	794,701	861,534	475,612	1,531,888	119,728
Same Period, 1942— Meat-export Slaughterhouses and Abattoirs ..	315,082	783,016	720,693	430,664	1,395,229	177,541

Slaughterings of Pigs

The 36,628 pigs slaughtered at meat-export slaughterhouses and abattoirs during the month of October, 1944, were distributed in weight ranges as follows:—

Up to 60lb.	27
60 to 120lb.	4,131
121 to 160lb.	20,588
161 to 175lb.	7,240
176 to 185lb.	2,230
186 to 200lb.	1,112
Over 200lb.	1,300
	36,628

The grading of porkers was 92 per cent. of first quality and 8 per cent. of second quality; and that of baconers was 83 per cent. of prime 1's, 12 per cent. of prime 2's, and 5 per cent. of 2nd quality.

In the different weight ranges the grading was as follows:—

	Prime 1's.	*Prime 2's.*	*Seconds.*
121-160 lb.	86 per cent.	9 per cent.	5 per cent.
161-175 lb.	75 per cent.	21 per cent.	4 per cent.
176-185 lb.	75 per cent.	18 per cent.	7 per cent.
186-200 lb.	82 per cent.	15 per cent.	3 per cent.

The Growing of Chicory

One important ingredient in the manufacture of coffee is chicory and it is not widely known that chicory is grown for this purpose in New Zealand. The annual acreage grown is not large, over the past 40 years never exceeding 100 acres. Chicory has been grown on the island of Inch Clutha in South Otago for upwards of 40 years and in recent years areas have been grown in the environs of Christchurch. On Inch Clutha one farm has specialised in the growing of this crop and there is situated on this farm, which is known locally as "the Chicory Farm," a plant for the drying of the chicory roots. Other farms adjacent to the chicory farm supply occasional acreages on contract when required.

— By —

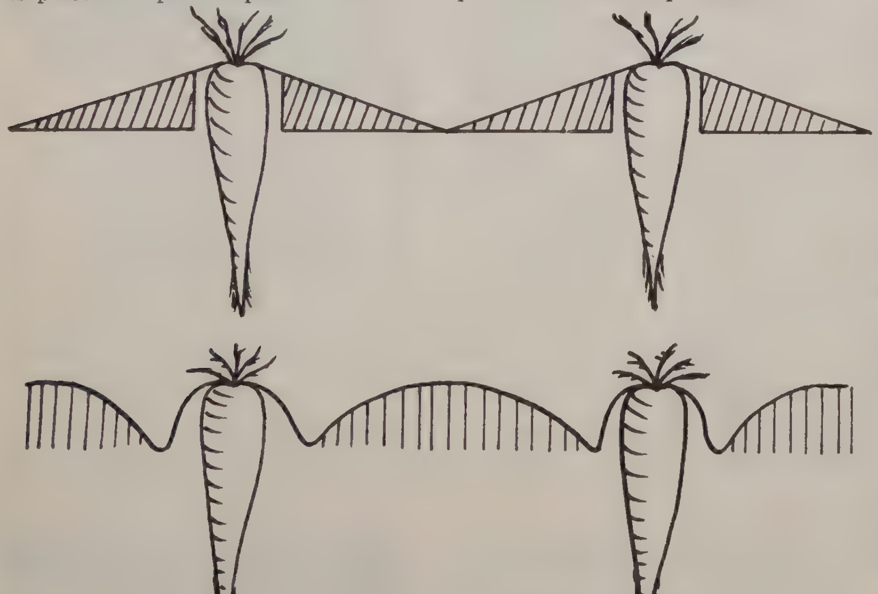
J. G. RICHARDS,
Assistant Instructor in
Agriculture, Balclutha.

CHICORY (*Cichorium intybus*) is a perennial plant possessing a tap-root which under ideal conditions will grow in length up to 2ft. 6in. The root is white in colour and somewhat resembles that of the parsnip except that the skin is smooth and not indented. The leaves are a darker green than those of the common dock, but otherwise they are very similar to it. The mature plant, which incidentally is not usually allowed to seed, has a seed stalk up to 3ft. high, which bears one or more pale blue rosette flowers just over an inch in diameter.

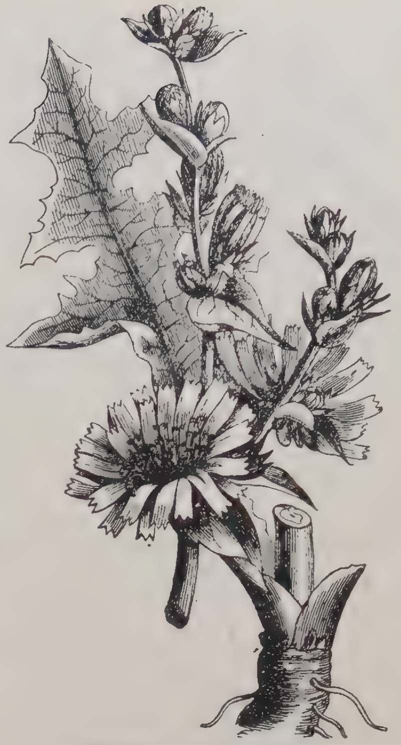
In the growing stage the leaves are palatable and nutritious, and prior to the harvesting of the roots these leaves are fed off with sheep. A number of years ago it was customary to include a few ounces of chicory in pasture mixtures, but on account of the relatively low bulk of feed produced it has lost its place as a pasture plant.

Soil Requirements

As with other crops a high yield per acre is aimed at and this is possible only when roots of good length are grown. The soil requirements for chicory should be such that the roots have every chance for downward growth. Soils suitable for chicory must, of necessity, be deep, possessing good drainage, be easily worked, and fairly high in fertility, for chicory is a gross feeder. The rich alluvial soil of the Inch Clutha Island measures up well to these requirements.



Method of harvesting the chicory roots.



Chicory (*Cichorium Intybus*)

Place in Rotation

Although customary to sow chicory after swedes successful crops have, however, been grown after wheat, oats, or potatoes. Sowing after lea is not favoured, the presence of undecayed turf causing difficulty in obtaining the desired fine and firm seed-bed. If, however, skim ploughing of grass is carried out in the autumn and the field winter fallowed, followed by deep ploughing up to 9 or 10in. in August-September, a satisfactory seed-bed can be obtained. The adoption of this method, however, leads to the field being idle for 5-6 months, and is, therefore, not favoured.

In the case of swede ground it is aimed to have the swedes fed off by early August, when it is double disced and then ploughed to a depth of 8in. or even greater. Subsequent cultivation with discs, harrows, and the roller will lead to a seed-bed of desirable fineness and firmness and free from weeds being obtained for sowing about mid-October.

Where stubble ground is used it is customary to skim plough in the autumn and leave fallow over the winter, but here again the question of idleness of the field, as in the case of lea, is involved.

Time of Sowing

Sowing generally commences about mid-October, and is completed by the end of the month. Seed at the rate of 2-2½lb. per acre is sown on ridges 22in. apart through a slightly modified mangold box. Up to 3½cwt. of reverted superphosphate is customarily sown.

Good yields of chicory are obtainable only if first-class growing conditions are present in the early stages of the plant's life, and one factor which can make or mar the crop is the absence or presence of weeds in these early stages. The suppression of weeds at this juncture is of prime importance if high yields are to be envisaged.

Intercultivation

A double scuffling when the plants are just visible in the rows severely checks weed growth and assists materially in the conservation of soil moisture. This scuffling should suffice until the plants have attained the size of from 3 to 4in. when they are again intercultivated. Scuffling is repeated periodically until the plants meet across the ridges. For ideal root development the desired distance between individual plants is 2½in. When plants become clearly recognisable in the ridges it is customary to pass up and down the rows with the hand hoe removing any clumps of plants which may be present, and those plants not in the direct line of the drill.

Long, even bulbs are the aim of the producer and these are best obtainable if the plants in the rows are so placed that root development is downwards rather than sideways. With the spacing of the plants to 2½in. apart and confining them to the direct line of the drill conditions most favourable to the production of the ideal bulb are provided.

Harvest

Crops which have been sown from mid- to end October are generally mature and ready for harvest towards the end of May. At harvest time the foliage of the plants is anything up to 18in. in height, and the removal of this foliage growth is necessary before the actual lifting of the bulbs can be undertaken. As previously mentioned chicory leaves are quite palatable to stock and the removal of the top growth of a crop is generally done by turning sheep on to the area. The feeding off is done in breaks, preferably using failing-mouth ewes, which do less damage to the bulb itself. Once the ewes have been placed on the break they can remain there until that particular break is fed off, for there are no attendant risks with the sudden change of feed as in the case of other crops such as rape.

With the removal of the tops by sheep the lifting of the bulbs from the ridges is undertaken by means of the plough, there being two distinct operations. An ordinary swing plough is used for the first operation, which is not complex in nature. All that is done

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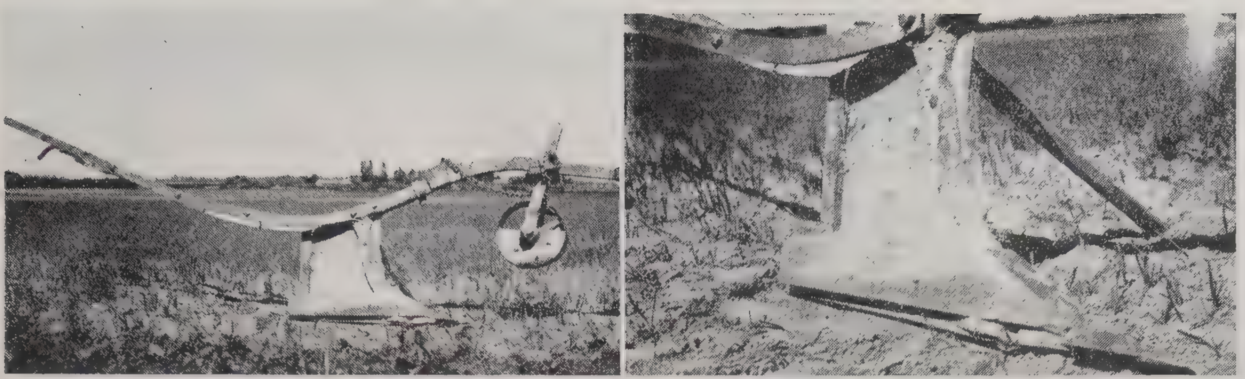

Left: Modified swing plough used for harvesting chicory. *Right:* Close-up of plough.

is that the sides of the ridges are ploughed off into the furrow, leaving the centre of the ridges. The diagrammatic transverse section shows what actually takes place.

On removing the sides of the ridges the actual lifting of the bulbs takes place, and the plough used is an ordinary swing plough from which the mould-board has been removed. The plough has been slightly altered so as to allow as great a depth as possible to be obtained. The accompanying photographs show the modified swing plough used. To plough out the bulbs the plough is drawn along the direct line of the ridge. The action of the plough in this operation is to ease the bulbs to the surface of the ground.

With the bulbs now exposed on the ground surface they are then thrown into rows, the product of each 10 ridges being placed into one row. Before being thrown into these rows bulbs are gently tapped together to remove any adhering soil. The bulbs remain in these rows awaiting removal to the factory. It is customary to remove the bulbs from the field within 10-14 days after lifting. Frost has no serious effect on the roots, and it is considered safe even if the bulbs have to remain in the field for upwards of a month. By allowing the bulbs to be freely exposed to the weather for some time they are relatively clean and free from soil when hand thrown into drays for cartage to the factory.

Yields

An excellent yield is regarded as being from 15-16 tons per acre, the average yield, however, being in the vicinity of from 10 to 11 tons. The roots are roughly 75 per cent. moisture. It requires, therefore, 4 tons of green roots to yield 1 ton of dried material suitable for grinding.

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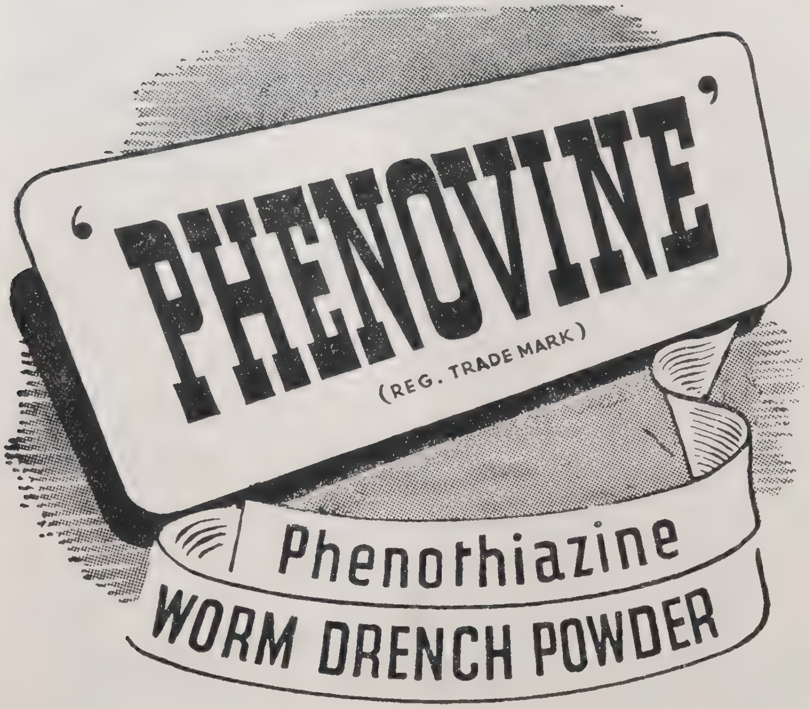

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VETERINARY NOTES

Blowfly Strike in Lambs and Sheep

TO the sheep farmer blowfly strike periodically becomes an acute problem, particularly on the higher country. Following the recent heavy rains in the central parts of New Zealand, sheepfarmers in Hawke's Bay, Marlborough, and especially in the Wairarapa districts, should periodically examine the lambs to detect recently struck animals. The recent rains will have stimulated a growth of feed and the general tendency will be towards a looseness of the bowels, if not actual scouring. Any staining of the wool of the crutch, whether from urine or scour, is liable to be struck when the flies are active. Urine staining of the wool and skin, together with the breakdown products on the surface of the skin, attracts the egg-laying fly. In muggy weather the warmth and moisture necessary for the hatching of the eggs and the growth and development of the maggots are most suitable, so that the strike of individual animals soon becomes apparent.

Investigation has shown that sheep of the Merino and half-bred flocks, because of the wrinkling and folds of the skin, are more liable to staining and more susceptible to strike, and that the plain bodied sheep are less susceptible. However, when it is considered that a single fly may lay from 1000 to 1200 eggs and that several generations may develop in one summer, it will be seen how important it is for all owners of sheep, irrespective of breed, to adopt all measures possible to prevent susceptible animals from becoming "blown" or "struck."

Flies Responsible

In New Zealand the flies responsible for strike are the yellow-brown hairy species and less commonly the bronze-green species. The bluebottles and the striped field flies do not blow living sheep, but confine their activities to dead animals. On the other hand, the striking flies may propagate readily on dead carcases in the absence of suitable live animals. This brings out the fundamental importance of the deep burial or burning of all such carcases. It would appear more important to prevent the breeding of the fly than to set traps or adopt other methods of destruction if breeding remains uncontrolled. As it is not possible to find every carcase for burial or burning, especially when dead rabbits, hares, birds, etc., provide suitable breeding grounds, some other methods of attack aiming at prevention have been given consideration and trial.

Preventive Measures

Probably the most important line of prevention is the prohibition of the conditions in our sheep which attract the egg-laying fly. To prevent strike on the breech an early crutching of all lambs in late December or early January is necessary, followed by a further re-crutching, dependent upon the weather and feed conditions. Extreme care should be taken not to cause skin injuries during crutching, as even small wounds will attract the fly.

Jetting with calcium arsenite solution has been found a useful preventive in Australia, but crutching is the more suitable procedure in this country. Jetting cannot be combined with crutching, as the possibility of the arsenic being absorbed through crutch wounds is too well known. Jetting is carried out in Australia after all wounds have healed, and is considered more economical than a second re-crutching.

All wounds in sheep, including foot-rot, should be dressed and treated in the usual way to prevent them being "blown" by the fly.

The affected lamb or hogget will be found dejected, away by itself, probably along the fence line or under cover of a tree. A blackish, moist area may be seen on the rump from a distance, but it is necessary to catch and examine all suspected animals at close quarters.

Treatment

Treatment (of the lamb) consists of clipping off the wool around the area where the maggots are operating. It is necessary to see that all maggots are killed and removed, otherwise a few may have escaped and operate in and form a second wound. Boric acid and glycerine, prepared by heating 3lb. of boric acid in one gallon of pure glycerine, forms a very good although rather expensive dressing for fly wounds. It kills the maggots, assists healing of the wound, and tends to prevent a second strike until complete healing has taken place. Cheaper dressings which are effective for destroying the maggots are (1) a 5 per cent. solution of zinc sulphate in water, or (2) a 4 per cent. mixture of carbolic crystals in whale oil. Boric acid powder alone may be dusted on. A 2 per cent. solution of liquid carbolic sheep dip or similar distinfectant is effective in driving out maggots, but it is wise to follow up with an oily application, using lubricating or whale oil. Kerosene or bluestone should not be used.

Finally, it may be mentioned that certain paddocks appear to favour the operation of the fly. A change of paddock and moving the sheep into the open, level paddocks, and away from cover or steep faces is worth consideration.

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Cows With Bad Quarters

"M.F.D.," Kaeo:—

In my herd of 37 cows I have 5 with infected udders. The quarters become hard and at the following milking thick yellow milk is produced. For the first 3-4 days the milk remains the same and then changes into yellowish water. As the cows produce only a small amount from each bad quarter, I do not put the teat-cups on them.

One of the cows had two bad quarters last season, and as they all calved in perfect order except her, I have an idea that the disease spread from her. At present the cows are in excellent condition and are producing a good quantity of milk from each sound quarter.

Could you give me some advice about these cows?

LIVESTOCK DIVISION:—

There is no doubt that the 5 cows in your herd are affected with mammitis. As only one animal was affected at the end of last season and up to calving-time this year, it is obvious that the other 4 have contracted the disease since calving-time. It is well recognised that the disease may be spread in a herd through milkers' hands, teat-cups, flies, and other agencies, and it is very necessary to take every precaution to prevent the spread of the disease to the healthy members of the herd.

Had the cow affected with two bad quarters last season been culled at the beginning of this season and used to suckle two calves, it is quite possible that the spread of the disease would have been prevented. On the other hand, it is possible for the udders of cows to appear sound at the beginning of the season, when in reality they carry infection which may flare up at any time during the spring flush season.

With the disease at its present stage in the herd, it is most important to separate the 5 infected animals and milk them last, after which the machines require to be thoroughly cleaned and scalded before the cups are applied to the sound cows at the next milking. It would be better, if time and labour available permit, to milk the 5 infected animals last, by hand. This would prevent the machines becoming involved in the spread of the disease to other members of the herd.

In regard to the infected quarters, it is probably better to dry these off completely for the season. If any massage or stripping requires to be carried out, all the thick milk and pus should be collected in a vessel and buried or burned. After dealing with an affected quarter the hands should be thoroughly washed and scrubbed before attending to sound cows or sound quarters.

Footrot and Drench Recipes

"F.W.R.B.," Paparoa:—

Could you give me the recipe for a good mixture to use in a footrot trough, also for a nicotine-bluestone-cobalt drench? Could you also tell me how I can bisectimise a ram so that he can be used as a "teaser"?

LIVESTOCK DIVISION:—

Bluestone used as a foot-bath should be of a 10 per cent. solution when used as a safeguard against footrot, and 20 per cent. solution in treatment (20 per cent. solution equals 1¾lb. to 1 gallon of water).

The nicotine-bluestone drench recommended is made as follows:—Dissolve 16oz. of bluestone in 5 gallons of water and add 16 fl. oz. of 40 per cent. commercial nicotine sulphate. Dose: Adults, 2oz.; two-tooths, 1½oz.; lambs, 8-12 months, 1oz.; lambs, 4-8 months, ¾oz.; lambs, under 4 months, ½oz. The administration of cobalt with the above drench is not likely to give good results, as there is too long an interval between drenchings. Drenching with cobalt should be twice weekly. If, however, there is a cobalt deficiency, this may be remedied by top-dressing or licks; two of those recommended are as follows:—

1. **1oz. cobalt sulphate, 4cwt. salt, 1cwt. linseed meal.**

2. **1oz. cobalt sulphate, 2½cwt. salt, 2½cwt. steamed bonemeal.**

The operation of vasectomy as performed on rams used as "teasers" consists of the removal of a section, about one inch in length, from each vas deferens. The region selected for the operation is the anterior neck of the scrotum where the vasa may be felt as hard cords about as thick as an ordinary teat siphon. After clipping the wool around the scrotum and belly an area about the size of the palm of the hand is shaved over the seat of the operation, which is then scrubbed with soap, water, and disinfectant, after which it is painted with tincture of iodine.

The ram is secured on his back on a table, bench, or box of suitable height for convenience of the operator, and a local anaesthetic is injected over the cords to anaesthetise several square inches of skin. The operator stands at the rear of the ram, an assistant places his thumb or forefinger on the posterior surface of the neck of the scrotum, pressing upwards, and with his other hand pulls the scrotum backwards towards the animal's tail. This manipulation pushes the vasa deferens towards the anterior surface and the operator, after feeling the vas by rolling it between his finger and thumb, makes a vertical incision through the skin about 1½in. long directly over it, and picks the structure up with the forceps. A piece an inch long is then snipped off with scissors. If the ram is fat some diffi-

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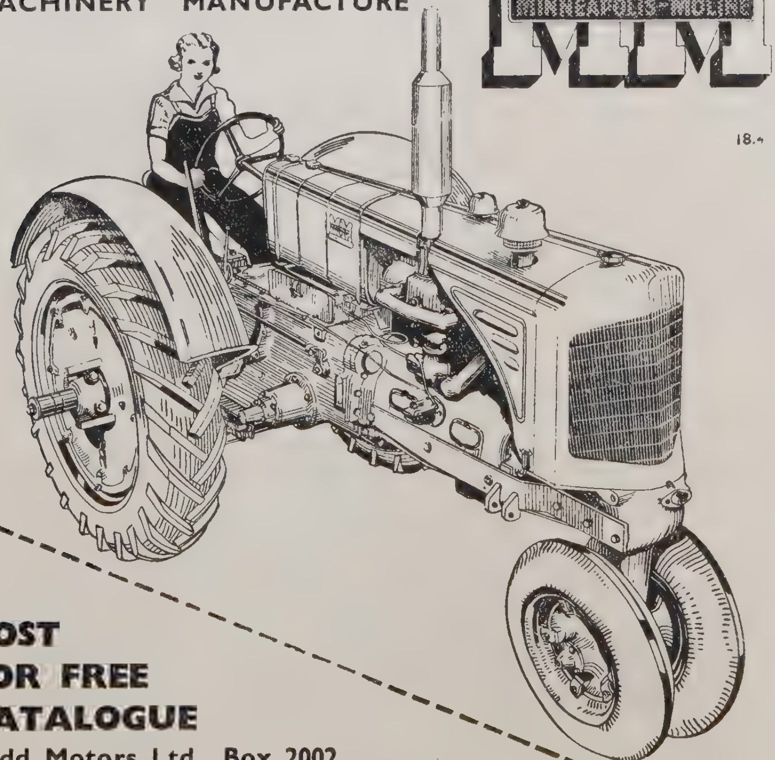

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culty may be found in picking up the vasa, but in thin animals there is little trouble. The skin wound is sutured and the sutures are removed a week or 10 days later. This procedure is repeated for the other vas from the second testicle.

The ideal is to perform an aseptic operation, but in practice it may be better to smear the wounds with B.I.P.P. before suturing. It is advisable to study the anatomy on a dead subject prior to operating.

Sulpha Drugs for Distemper

"W.J.R.," Helensville:—

I have been informed that a drug of the sulpha group named M and B 693 is a reliable remedy for distemper in dogs. I would be grateful if you could advise me if this is so; also how much you would need to give, when, and how.

LIVESTOCK DIVISION:—

The drug you mention is a reliable remedy for distemper, as is also sulphanilamide. The dose for an average farm dog is 20 grains four times daily for the first 3-4 days, and this may be given in capsule, tablet, or powder form. If the dog is going off his food, it is advisable to discontinue the dosing for a day and then carry on with smaller doses until improvement is shown. Neither of these drugs is obtainable except on the written prescription of a doctor or qualified veterinary surgeon. It is most important that treatment is started in the early stages of distemper and that the dog is protected from changes of temperature by confining him to a box full of hay. He should be taken out of this for a few moments twice or three times a day, and a good brushing at this time freshens him up considerably. Unlimited fresh air should be allowed and sleep encouraged, and convalescence should last at least a month.

Ploughs and Ploughing.

PLOUGHS have been designed to work under a wide variety of soil and topographical conditions as well as to produce differing mechanical effects in their passage through the soil. The result has been to produce a very wide range of types, each particularly adapted for a certain kind of work, or for special conditions of soil, or for the power available for traction.

Apart, however, from differences in design, certain basic features are common to most ploughs, and the general principles of operation are the same.

This subject is fully discussed in bulletin No. 185, which is obtainable *free* from the Department of Agriculture, at Auckland, Wellington, Christchurch, Dunedin or Invercargill.

SEASONAL NOTES

Management of Pastures

FROM now onwards pastures will commence to dry up in many parts of New Zealand and grasses and clovers will throw up seed stalks. For production of good-quality feed this natural course should be discouraged as much as possible by stock management.

The ideal is to permit the feed to attain only that growth which will be entirely consumed by the stock available on the farm. On most farms there is a variety of stock which makes grazing management an easier job. On sheep farms fields which tend to run away from the sheep should be grazed by cattle, and the hungrier these are the better. On dairy farms sheep can be usefully employed to follow the dairy herd and clean up patches of ungrazed fodder. Young cattle on dairy farms are not good followers, because they are usually not numerous enough or so voracious in their appetites as the milking cows, and will therefore continue to consume only that part of the sward which the cows have been eating, leaving the roughage entirely alone. Sheep can be punished at this time of the year on dairy farms and forced to consume the leavings of the dairy herd. A pasture eaten cleanly produces an even and more leafy bite of feed. Patches which are not consumed tend to run to fog and weeds and lack of clover.

Care must also be taken, however, at this time of the year not to graze the pastures too close. Particularly is this important on soils which dry out unduly in the summer and where the chief pasture plants are not truly perennial or where the pastures are thin. Under such circumstances the pastures should be permitted to get out of hand to an extent which will prevent escape of soil moisture and supply sufficient seed for pasture re-establishment in the autumn. In dry climates special feed provision should be made each year to ensure that the pastures will be managed in this way. If this is done, it will be found that more stock will be carried not only in the summer, but in the other seasons which follow.

◆

Liming and Preparation of Land for Grass

BY now land under preparation for sowing to permanent grass in the new year will be worked down to a fairly fine and firm condition, and henceforward the soil should be harrowed after the soil is dry enough following falls of rain to destroy germinating weeds and to further fine and consolidate the ground.

Arrangements by now should be well advanced to secure consignments of lime for application to the ground preparatory to sowing pasture and for topdressing.

For new grass the lime should be applied now so that the soil is in a sweet condition at the time of sowing. For topdressing the transport and application of lime should be carried out any time during fine weather and not when the soil is wet. The reason for doing so is not because the lime is more efficacious applied then, but because transport on clay roads and about the farm and application are usually thereby much more easily accomplished. Less damage is done to roads, gateways, and fields when the ground is firm, and the lime can be carted right on to the field if some covering is provided in case of inclement weather. It is realised that the farmer is often particularly busy at this time of the year, but nevertheless he realises that much inconvenience and hours of work will frequently be saved if cartage of bulky materials such as lime is carried out at this time of the year; and with lime there are the added advantages outlined above.

Greenfeed

THE arable farmer should now determine what he is going to grow on his fallow land and on the fields of grain which are being or are about to be harvested. He will need to determine from the state of his growing fodder crops the area of greenfeed which he will require to see his stock through the next nine months—the period of lower grass production—and he may have to adjust to a small extent the numbers and kind of stock the farm will carry with the cropping programme in hand.

There is a fairly wide range of choice of greenfeeds which he can grow to supplement his pasture and the already established fodder crops sown in the spring and summer. The sooner the crops are sown the earlier the production of feed, and if extra feed is required in the autumn, early sowings are necessary. It is important to note also that late sowings will not provide winter fodder, and consequently after the early-harvested crops are out of the way the ground should be immediately worked for sowing. Because of its readiness for sowing and higher moisture content, the fallow land should be sown first.

Of the crops available barley is suited to warm, dry conditions and is not as highly productive in winter as oats or Italian ryegrass sown early. Sowings of cape or black skinless barley in January will provide greenfeed in February and March, and subsequent grazings of the barley will be produced. Algerian oats sown in January can be depended on for grazings from March-April onwards. Soft turnips sown in January or February will provide winter feed, but this crop is a risky one in dry climates and requires a reasonable amount of rain falling subsequent to sowing to germinate and grow the crop. February sowings of Italian ryegrass and cape or black skinless barley will produce feed from the early winter onwards, whilst Algerian oats sown then will provide winter and early spring feed. Sowings in March of Italian ryegrass and Algerian oats will, except in warmer climates where winter feed will result, provide grazing in the difficult months of August and September and until the summer.

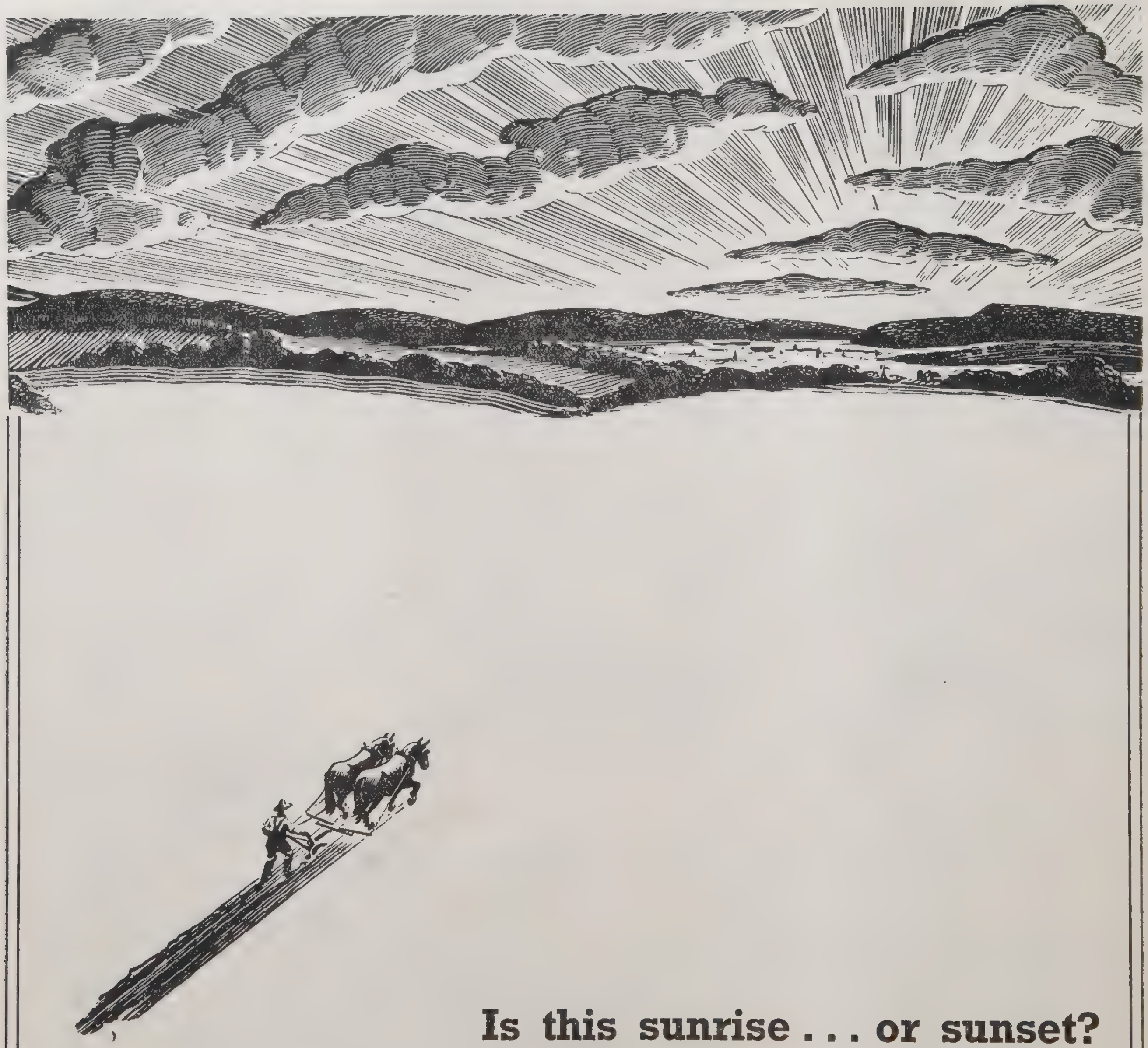
Measuring Stock Foods

USE of the following table will be found more satisfactory than the haphazard and often wasteful method of measuring stock foodstuffs by handfuls:—

1 bushel = 8 gals = 32 quarts.
1 kerosene tin (4 gals.) = half a bushel.
A box 4in. x 4in. x 4in.* = 1 quart.
A box 6in. x 6in. x 8in.* = 1 gallon.
A box 12in. x 12in. x 15¾in.* = 1 bushel.
* Internal measurements.

A quart tin filled, but not packed, would represent $^1/_{32}$ of a bushel and the weight of the contents would be:—

	lb.	oz.		lb.	oz.
Wheat	1	14	Peas	1	14
Maize	1	12	Barley	1	6
Oats	1	4	Salt (common)	2	0
Bran		10	Pollard	0	10
Wheatmeal	1	8	Meatmeal	1	8



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Intercultivation and Weeding of Crops

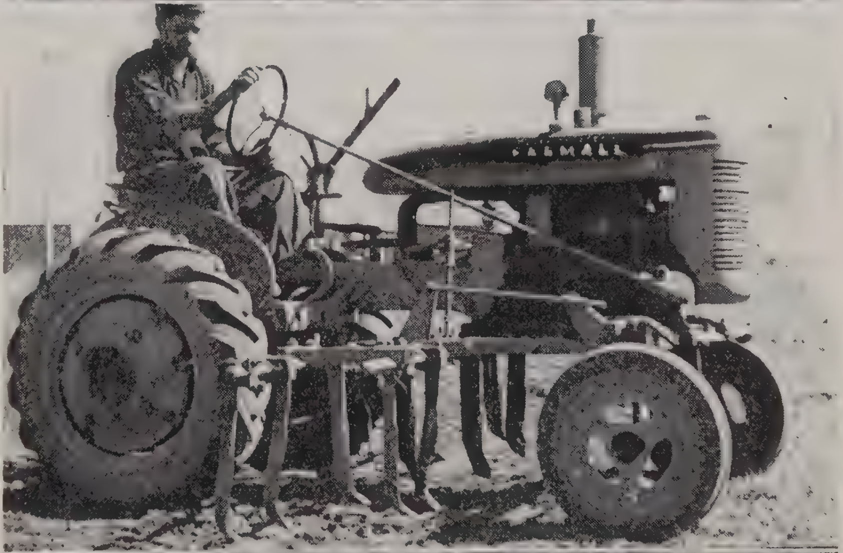
EARLY-SOWN fodder crops will require continued attention to prevent weed establishment. There is no doubt of the importance of keeping the crop clean, particularly in the early stages, when the young plants are particularly susceptible to shortage of moisture and plant food and smothering which may be brought about by unchecked weed growth.

Frequently millions of weed seeds will appear before the crop seeds germinate. If the ground is dry enough, the weed seedlings can be destroyed easily by using light tine harrows. Recent work indicates that a great deal of labour can be saved in keeping crops clean by appropriate employment of weedicides, and the use of power kerosene for weed destruction in carrots shows considerable promise. Even when the crop is through the ground, judicious use of the tine harrows may considerably lighten the work of after-cultivation, and with crops sown broadcast it may be the only means available of combating weeds at this or other stages.

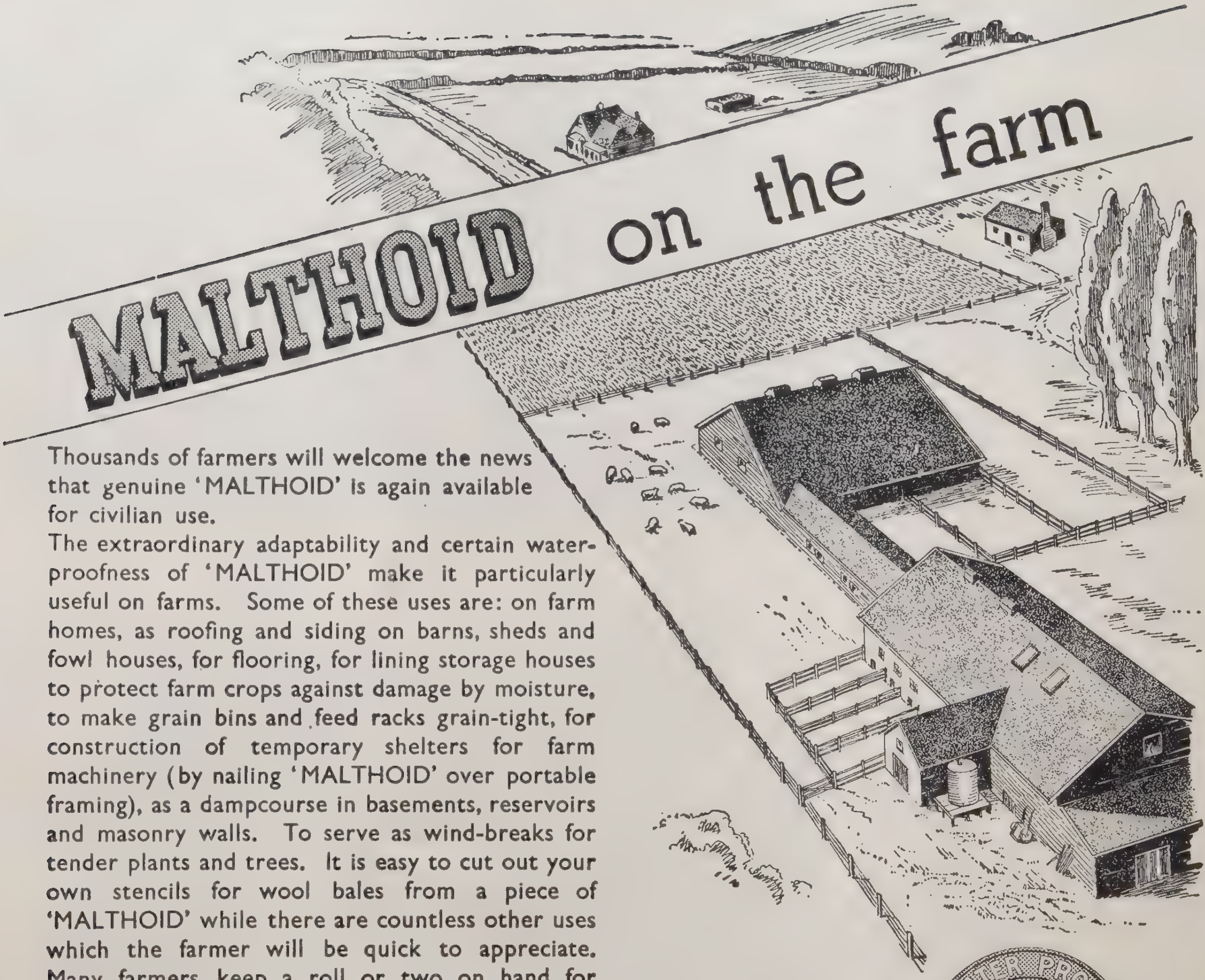
When it is no longer possible to destroy weeds by the above easy methods the farmer is reduced to the time-honoured hand hoeing and hand weeding in the rows and the use of the intercultivator, or scuffler. While hand hoeing, the plants can be singled to give proper spacing, and this work is particularly valuable where the strike is on the thick side. Early intercultivation may be deep and wide, but should be reduced in width and depth as the plant roots range outwards and downwards in the soil. The cultivator should keep in mind that the main object of his work is to destroy weeds, and this should be accomplished with the minimum destruction of the rooting system of the plant. Moulding of potatoes should be carried out with care and only to that extent necessary to facilitate digging operations.

Intercultivation of crops has been considerably eased by the development of tractor-drawn intercultivators. By this means the ground is quickly and efficiently covered and there is less chance of the weeds getting beyond the control of the cultivator. The width of the wheel of the modern tractor can be easily and quickly adjusted to the crop, and the driver is placed to see that the knife edge tines of the implement just clear the rows of plants during the early stages of growth. The modern tractor-drawn cultivator is speedily attached to the tractor, and is easily adjusted for a wide range of crops and row widths.

—J. E. BELL, Acting Land Utilisation Officer, Wellington.



MALTHOID on the farm



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ORCHARD AND VINEYARD

Pest Control—Harvest Preparations

WITH the approach of hot and dry conditions infestations of insect pests can be expected, and spraying as advised in previous notes should be continued during January and February. Unless an adequate coverage of lead arsenate is kept on the trees and fruit, a considerable amount of damage can be done by codling moth and leaf-roller caterpillar.

Red mite usually makes an appearance at this time of the year, and a close watch should be kept to prevent its increase, as this pest will cause considerable damage to foliage if no control measures are taken. Summer oil 1-100 should be applied, and if necessary repeated in 10 days. (Summer oil should not be applied within 10 days of sulphur sprays).

In dry weather conditions leaf hopper may become troublesome, but this pest may be readily controlled by adding nicotine sulphate 1-800 to the sprays being applied at the time the hopper is in the nymph stage. As these two pests are found mostly on the underside of the foliage, care should be taken to give the underside of the leaves a thorough wetting.

In districts where ripe spot and bitter rot are in evidence Bordeaux mixture 1-2-50 can be substituted for the sulphur sprays during January and February. If Bordeaux is applied during summer months, a wetting agent should be used in order to reduce spray deposit on the fruit. Casein ¼lb. with hydrated lime ¼lb. to 100 gallons of spray has proved a suitable wetting agent.

The spraying of peaches should be continued with lime sulphur 1-200, plus colloidal sulphur 2lb.-100, every 14 days to within a fortnight of harvesting for the control of brown rot and leaf rust.

Harvesting Stone Fruit

Stone fruits should now be reaching a stage of maturity for picking, and a good deal of care must be exercised in handling these fruits, as bruising through careless handling will rapidly set up decay and often result in a severe loss to the grower. Fruit should be sized and packed and the better quality and larger sizes should be wrapped. The stage of maturity for picking must be determined by the distance the fruit is required to travel. Ripe fruit should on no account be packed with firm fruit which would take some time to reach its destination. With most varieties it will be necessary to make several pickings, and only those fruits which have reached the desired stage of maturity should be harvested.

Handling Pip Fruit

During January the harvesting of pip fruit will commence, and growers should check over their packing and grading equipment. The packing shed should be thoroughly cleaned out and necessary materials placed in suitable positions for quick handling. Grading machines should be checked over to see that they are in good working order and any oil, dirt, or grease on belts or rollers should be removed, in order to avoid marking of the skin of the more tender varieties of apples. Picking bags, ladders, lidding press, wiring machines, and orchard cases should also receive attention, and repairs and adjustments should be effected where necessary.

Thinning

Whilst the main thinning of apples and pears should be completed, a second thinning during January is advisable to break up clusters which may have been missed in the main thinning, and to remove distorted, badly russeted, and disease-infected fruit, also fruit which will obviously not reach marketable size.

Cover Crops and Cultivation

Cultivation should be continued during the present month, and, if conditions are dry, throughout January, in order to conserve all available moisture. Where it is intended to sow cover crops the ground should be prepared and seed sown during January. Blue lupins are considered a suitable green crop for most soil types, but other leguminous crops, such as vetches and peas, have proved satisfactory. If blue lupins are sown, the sowing should be at the rate of 1½ bushels per acre, and if possible a fertiliser should be sown with the seed. Superphosphate at the rate of 1½cwt. per acre is suitable for this purpose.

D. HOGG, Orchard
Instructor, Mapua.

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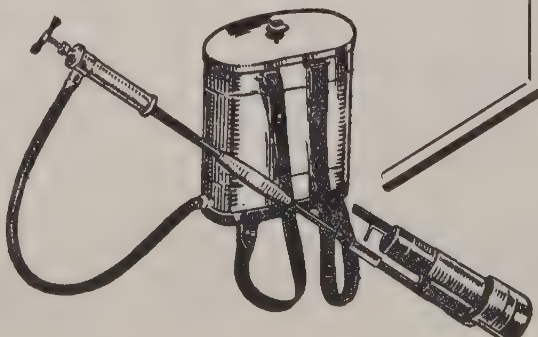

Citrus Notes

Moisture Conservation and Cover Crops

CITRUS trees require a liberal supply of soil moisture throughout the year, particularly large trees carrying a heavy crop. Soils containing a high percentage of humus will hold much more moisture than land lacking in this respect; therefore the application of liberal supplies of humus around the trees is of immense value in conserving soil moisture.

The bottoms of used haystacks are suitable for this purpose. The mulching of trees with freshly-cut hay also assists greatly. It is advisable to do the mulching as soon as possible after the mowing, otherwise much of the moisture in the hay is rapidly dried out and its usefulness for conserving soil moisture is lessened. In orchards where mulching is not possible the frequent cultivation of the surface soil is of use in conserving moisture, but has the disadvantage of hastening the destruction of the humus in the soil. However, sufficient cultivation should be maintained until at least the end of February to keep down weeds which are likely to be serious competitors for the limited soil moisture during the hot and relatively dry period of the year.

Cover Crops

The most widely employed method of maintaining the humus supply in orchard soils is by growing between the trees cover crops, which are worked into the soil. Leguminous crops are of particular value for this purpose on account of the nitrogen gathered from the air by such plants and stored in root nodules. Suitable leguminous crops include blue lupin, peas, vetches, and red clover, and for non-leguminous crops oats or mustard or a combination of the two.

Seasonal Reminders

Mow orchard pastures more frequently during dry periods.

Keep weeds suppressed during the summer months.

Spray in late December and January, if necessary, for control of leaf-roller caterpillar.

Frequent "rubbing-up" of tanglefoot bands is necessary to maintain control of dicky-rice weevil.

Lupins are by far the most popular cover crops for citrus orchards. They will stand considerable frost without injury, are not unduly damaged by ordinary orchard traffic, generally provide the greatest bulk of vegetable matter, are readily incorporated with the soil, and in the main citrus districts continue to make good growth during the winter months.

The land should be well cultivated prior to sowing the seed. The application of about 2cwt. per acre of serpentine superphosphate at the time of sowing will greatly benefit the resultant crop. Lime should not be applied with lupin seed. The seeding rate for lupin is 1½ to 2 bushels per acre, which should be broadcast and harrowed or disced in.

Time to Sow

It is important that cover crops should be sown at the most suitable date. Crops sown too early are liable to compete seriously with the trees for the available soil moisture if there should be inadequate rainfall during the autumn months; also early sowing means a higher crop during the winter harvesting period, making damp conditions for the pickers and rendering ladder work in particular more laborious. On the other hand it is important that the crop should be worked into the soil not later than August, so that the temporary ill effects on the soil of the decomposition of the vegetation, which occupies a period of approximately six weeks, will have passed before the commencement of the critical blossoming period. The lupins should be commencing to form pods when worked in, thus securing the maximum benefits from the crop.

Considering the relative importance of all of the foregoing factors it is considered best to sow lupins, peas, vetches, and red clover during the first half of March, provided there is sufficient soil moisture at that time to ensure good germination of the seed and subsequent crop establishment. Mustard and oats could be sown at the end of March. The autumn application of fertilisers to citrus trees should be made sufficiently early to permit their working into the soil while the land is being prepared for the cover crop.

Dicky-rice Weevil

Bands of tanglefoot applied to the trunks of trees to control dicky-rice weevil require to be "rubbed up" periodically to break the film which forms on the surface of the bands. The frequency of this operation is governed largely by the amount of dust blown about in the orchard. Especially during dry periods and in cultivated orchards the band, to be maintained in an effective condition, will require this attention every four to six weeks.

Leaf-roller Caterpillar

Orange and grapefruit orchards subject to appreciable damage by leaf-roller caterpillars injuring the young fruits should be sprayed with lead arsenate, 1½lb. to 100 gallons. The first application should be made late in December, and a second, where necessary, three to four weeks later. It is not advisable to continue the use of arsenate sprays after the fruit has attained a diameter of about one inch on account of the adverse effect this material has on the flavour of the fruit when applied later in the season.

—*P. EVERETT, Orchard Instructor, Kerikeri.*

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Work For January

> **"Do the thing yourself! I would set that down as the mintage of wisdom in making a real home. Not because you have to do it, but because you *like to do it.*"**
>
> **—Chelsa C. Sherlock.**

FOR the vegetable gardener the quotation given above should constitute an admirable maxim for the coming year. To anyone interested in natural phenomena the growing of vegetables is a highly fascinating study. This is equally true whether one is engaged in it commercially, as a hobby, or as an aid to domestic economy.

There is something truly wonderful in covering a few small seeds with some soil and to watch the subsequent results in the production of acres of vegetables, the consumption of which contributes so much to human welfare. Indeed, medical science advises that the absence of vegetables from our daily diet is a menace to the nation's health and physical well-being.

While it may be correct to say that January is not a very pressing month for work in the vegetable garden, yet on looking round one will usually find plenty to do.

Tomatoes

In favourable localities, where these notes are read early enough, a small planting may be made not later than Christmas. If this is done, and well-grown plants set out which will receive good treatment, at least one good truss of ripe fruit should be secured and plenty of immature tomatoes which can be used to good advantage for domestic purposes. Except in specially dry situations, this late planting should be a staked variety. Moist conditions which may obtain during late autumn might, by inducing blight attacks, prove disastrous to plants of dwarf habit. When fastened to stakes the plants should not be allowed to grow more than 2ft high. To obtain ripe tomatoes constant spraying is necessary and should never be neglected.

The early or main planting of tomatoes can be trained to 4ft. and higher, if climatic and seasonal conditions are favourable for mature fruit development. During January fruit will be setting freely and developing. As this is proceeding the undesirable practice of defoliating the plant is sometimes resorted to, it being assumed that earlier ripening of the fruits will result. This is a mistaken idea, and such action may lead to the production of inferior tomatoes through severe sunscald.

Where dense bottom foliage obtains the heavy leaves **under** the first truss of fruit can be removed. This will permit of easier hoeing and allow better air circulation about the plants. As the plants are reaching the height to which they are to be permitted to grow pruning, spraying with Bordeaux mixture, and shallow hoeing should not on any account be overlooked, if a full crop is to be harvested.

Celery

During January and the holiday period the celery bed may be allowed to become too dry. Abundance of water is of vital importance to this crop when dry weather conditions obtain. The plants should never be allowed to become stunted, this condition being the best evidence of neglect. "Trenched" celery is not so likely to suffer from dry conditions as plants set in a bed; these should be watered by the soil being given a thorough soaking. Spraying at 10-14 day intervals is necessary for the prevention of blight attacks. Plants growing in trenches become blanched without any effort on the part of the grower, but those in beds or rows should be "banked" by pulling soil around the heads, placing boards along the rows, or wrapping the plants with paper. This should be done 14-21 days before harvesting.

Onions

This is one crop in the garden which should not now be watered. Dry weather conditions are necessary for good bulb maturity, and wet soil will prolong vegetative growth. Provided the bed has been maintained in a reasonably weed-free condition, further hoeing is not essential.

Shallots

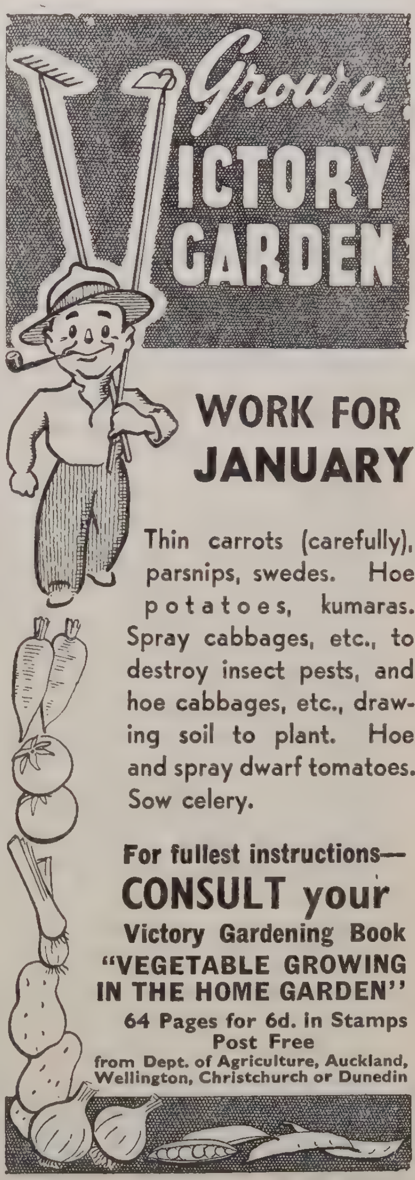
The above remarks relative to onions are directly applicable to this crop. Properly-grown shallots will be well on towards maturity at the end of January, but February is considered the month when the crop should be lifted.

Leeks

Plenty of water and regular applications of liquid manure should be given to leeks in order that the plants may become quickly established and develop initial growth. Leeks will stand very heavy fertilising, especially with stable or farmyard manure, and where this form of organic manure is available it is to be preferred to inorganic. Regular shallow hoeing is recommended. This will destroy weeds and create a soil mulch which will prevent undue evaporation of moisture from the soil.

Swedes

In districts in the North Island where conditions are not particularly dry, and where seed of this desirable root crop has not yet been sown, there may still be time to have a bed well under way before late autumn. Sowing seed of this variety during early January



WORK FOR JANUARY

Thin carrots (carefully), parsnips, swedes. Hoe potatoes, kumaras. Spray cabbages, etc., to destroy insect pests, and hoe cabbages, etc., drawing soil to plant. Hoe and spray dwarf tomatoes. Sow celery.

For fullest instructions—
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Victory Gardening Book
"VEGETABLE GROWING IN THE HOME GARDEN"
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—it is inadvisable to sow later—should be done carefully. In furrows not less than half an inch deep the seed is sown and covered with moist soil; moist compost is better. Where possible, shading by spreading light scrim over the bed is advisable. To prevent the seed being washed to the surface watering can be done on top of the scrim covering. As soon as germination starts the covering should be removed and the bed kept moist.

Lettuce

This is a cool-weather vegetable, and rather difficult to grow to perfection during warm, dry conditions. To many people it has become a necessary part of the daily ration, and therefore must be produced in the home garden, if it is to be used in fresh condition. To do this the seed should be sown in rows and the plants subsequently thinned out to stand 12in. apart each way. Transplanting lettuce during dry weather when warm winds prevail is risky. The main reason for seeding and thinning is that the rooting system is not disturbed, and consequently the growth is not temporarily impeded. Water, however, must be plentifully supplied.

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Carrots

In view of the importance of this crop for household use, and the necessity for combating the disastrous effects of aphides on the carrot foliage, it is considered advisable to repeat the formula for making "Paranaph," which is considered highly efficient as an aphicide and relatively cheaper than other specifics. It is as follows:—To 1 pint of water add 3½lb soap—soft soap is preferred. Simmer over a fire with constant stirring until all lumps have disappeared and a perfectly uniform melt has been obtained. Add 6oz. of refined naphthalene, and stir until dissolved. Remove from the fire and add 1 pint kerosene. Stir until well mixed.

DON'TS

DON'T put off spraying potatoes and tomatoes till after rain. Try to anticipate weather changes and spray before the showers come down.

DON'T abuse your soil by neglect. Treat it well, and it will pay good dividends by producing abundance of fresh, nutritious vegetables.

DON'T assume that vegetables can be successfully produced by the periodic application of a few handfuls of fertiliser taken from a bag. That is not good husbandry and surely leads to disaster.

The finished product should be semi-solid and uniform in texture throughout.

It can be used at various strengths for aphides, scale insects, fleas in buildings, and on dogs. It is also very effective for cleansing the hands after they have been soiled with oily grease from handling machinery. In the home garden it can be used at a strength of 2oz. to 1 gallon of water for the destruction of aphides on all members of the cabbage family and other plants affected by this pest.

It is probable that the use of Paranaph may be of considerable importance in minimising the damage likely to result from the carrot rust-fly. This pest must not be confused with aphides. The rust-fly attacks the root, while aphides destroy the leaves. To afford maximum protection spraying should begin as soon as the leaves show prominently above ground. This applies particularly during very dry spells of weather, which condition is favourable to aphis development.

Winter Green Crops

With the possible exception of late Savoy cabbage, which may still be set out, planting of late autumn and winter-maturing varieties of the cabbage family should have been completed before the end of December. Provided the plants were "puddled" in when setting, a good growing start will have been made, but a sharp lookout will need to be maintained for damage by caterpillars, in addition to aphides.

Liquid manure applied after heavy watering will benefit the plants, especially Brussels sprouts, broccoli, and kale, which will be longest in the garden.

Silver Beet

January is the time for sowing seed to secure plants for February setting. The variety specially recommended is Giant Broad White Rib. Of this variety there are two strains, and plants from the seed of the dark green curled leaf strain are preferable.

If practicable, when planting out this crop, a part of the garden should be selected which will not be required for setting out early spring crops. Grown in soil that is not too rich in nitrogen, the crop will remain in good condition to the end of September, but will run to seed when warm weather starts.

Where inorganic fertilisers are used a mixture of 3 parts of superphosphate and 1 part sulphate of ammonia broadcast at the rate of 2oz. per sq. yard and well worked into the top soil before planting will give good results. Silver beet transplants well and should be set 8 to 10in. apart in rows spaced 18 to 20in.

Watering

During January and February vegetable plants generally require a great amount of water, and it is customary for the home gardener to water regularly, but without giving sufficient consideration to the quantity applied or the depth to which it may have penetrated. Watering in this way is not only unsatisfactory, but can have serious and sometimes disastrous consequences with the rooting system of the plants. Surface watering induces surface rooting, and when the top soil dries under the heat of the sun and wind those roots which branched out from the plants in the temporarily moist soil are destroyed.

To promote deep rooting the soil should be thoroughly soaked, hence a reserve of moisture is created which will encourage root development, the logical outcome of which is the acquisition of more food to assist maximum plant and crop production.

Spring Cabbage

In southern districts sow spring cabbage seed before the end of January.

—*D. K. PRITCHARD, Instructor in Vegetable Culture, Wellington.*

NOTES FOR BEEKEEPERS

Honey House Equipment

IN some early districts extracting will have already commenced, but the main extracting generally commences soon after the New Year. Extra supers should be placed on colonies as required. Do not delay in this respect as, once the main honey flow commences, nectar generally comes in at a great rate and the bees require ample storage room to facilitate the ripening of the honey.

Everything in the honey house should be in readiness for handling the crop with the least amount of labour and delay. Thoroughly clean out the extractor, tanks, and all equipment that is to be used in dealing with the crop. Check over the running of the extractor and where necessary give the required amount of oil. See that the belt from the motor to the extractor is sound and in fit condition to finish the season. See that the rubber tubing on the uncapping knives has not perished. Many annoying delays experienced during extracting can be avoided if more attention is given to the preliminary check over.

Drip Tray

The shifting of supers full of honey without honey dripping on the floor of the truck and honey house can be achieved successfully by the use of drip trays. These are shallow trays made of sheet metal to the following size: Length 20¼in, width 16¼in, depth 1½in. If the top edge is rolled over, a very neat and much stronger tray results. To keep the super from the bottom of the tray, four small blocks are soldered into the corners so as to allow the super to be about ½in from the bottom of the tray. Diagram A shows drip tray set on top of wooden platform used in conjunction with the hand barrow.

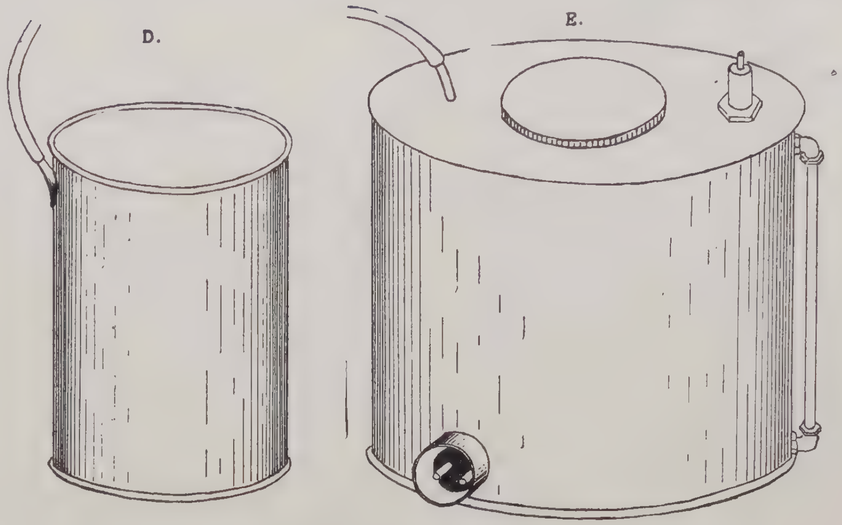
Hand Barrow

For handling heavy supers with speed and the minimum of effort, the barrow described and illustrated in the September, 1942, issue of the "Journal of Agriculture" will be found most efficient.

Uncapping Equipment

Hand Knife.—The type of knife shown in diagram B is intended for use after being dipped into a container of hot water. By keeping a very keen edge on this type of knife, it can be used quite successfully cold. This saves the necessity of having a heating arrangement in the honey house.

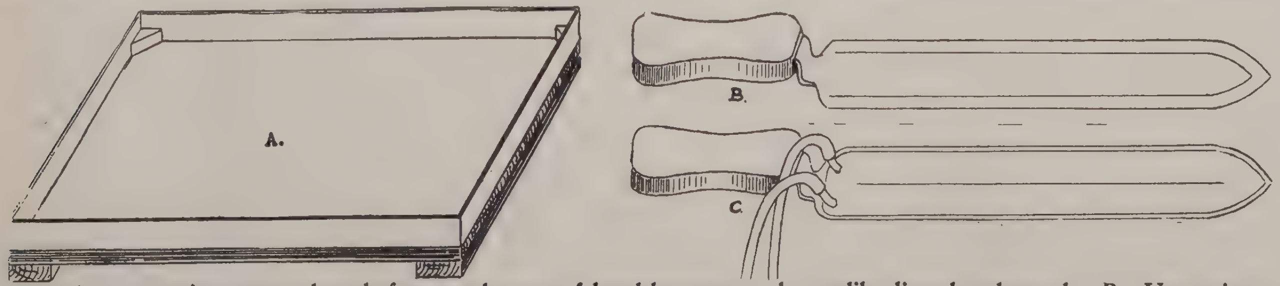
Steam Uncapping Knife.—For speed and ease of handling, it is preferable to use a steam-heated knife as shown in diagram C. The steam is generated in a small boiler placed over a primus lamp and led through a rubber tube to one of the protruding tubes on the knife. The exhaust steam is led away by another tube to a container, D, where it is condensed. A definite improvement on the kerosene lamp or primus for generating the steam is the electric boiler shown in E. Whatever type of steam boiler is used, precaution should be taken to see that it is fitted with a safety valve of some dependable type. Nasty accidents are likely to occur through failing to observe this safety precaution.



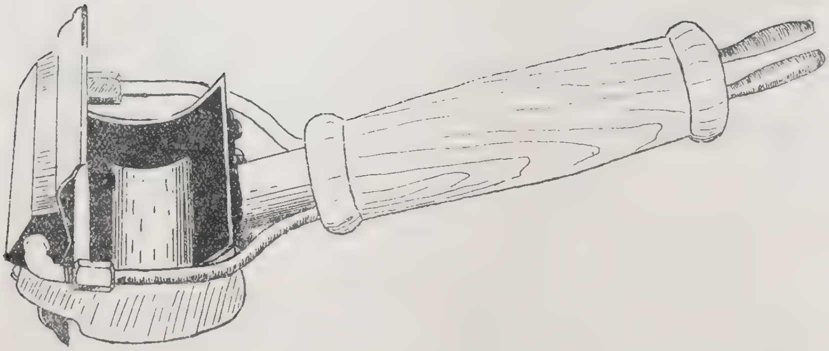
D. Condensed steam container. E. Electric steam boiler.

The Rosedale Uncapping Plane.—This is an entirely new departure in the method of cutting off the cappings from the combs. In construction it is very much like an outsize safety razor and is illustrated in diagram F. It takes some time to get used to the handling of this plane, but once the operator becomes proficient it is quite efficient and not so tiring on the wrist as the uncapping knives.

Power Uncapping Knife.—This is built on the same pattern as the steam-heated knife and oscillates rapidly between two spindles, one at each end of the knife. A small electric motor is generally used to provide the means of power. The combs are allowed to move down over the moving knife, but the strain in guiding the combs over the cutting edge is more fatiguing than the use of the hand knife. If improvements can be developed in this type of machine, it will become popular with commercial honey producers.



A. Drip tray resting on wooden platform so that toe of hand barrow may be readily slipped underneath. B. Uncapping knife. C. Steam jacket on uncapping knife.



F. Rosedale uncapping plane.

Uncapping Tray and Baskets.—Numerous types of equipment have been devised to deal with the cappings as they come off the knife. Unfortunately, quite a number of the methods, although they appear to work very satisfactorily, are definitely responsible for lowering the grade of the honey which comes away from the apparatus. Where heat, especially at a degree to melt wax, is used, the honey will suffer to some extent. Commercial beekeepers usually operate in two different ways; some extract the same day that the combs are brought in from the apiary, and others collect the supers as they become filled, storing them in the honey house until sufficient have been collected to ensure several days of extracting. It can thus be seen why it is that a certain type of equipment will work most satisfactorily with one beekeeper while with another it proves useless.

The set-up of uncapping equipment as shown in sketch G gives satisfactory results for those extracting the same day as the honey is brought in. It minimises the risk of loss of points in grading due to excessive heat, while at the same time it allows of maximum separation of the honey from the capping wax. Its construction is simple and in many cases could be done by the beekeeper. At the present time it may be impossible to secure suitable wire gauze of about ¼in mesh to construct the baskets. Only one basket is shown in the drawing, but it is advisable to have at least two so that as soon as one is filled with cappings it can be moved along under the tray and the empty one put in its place.

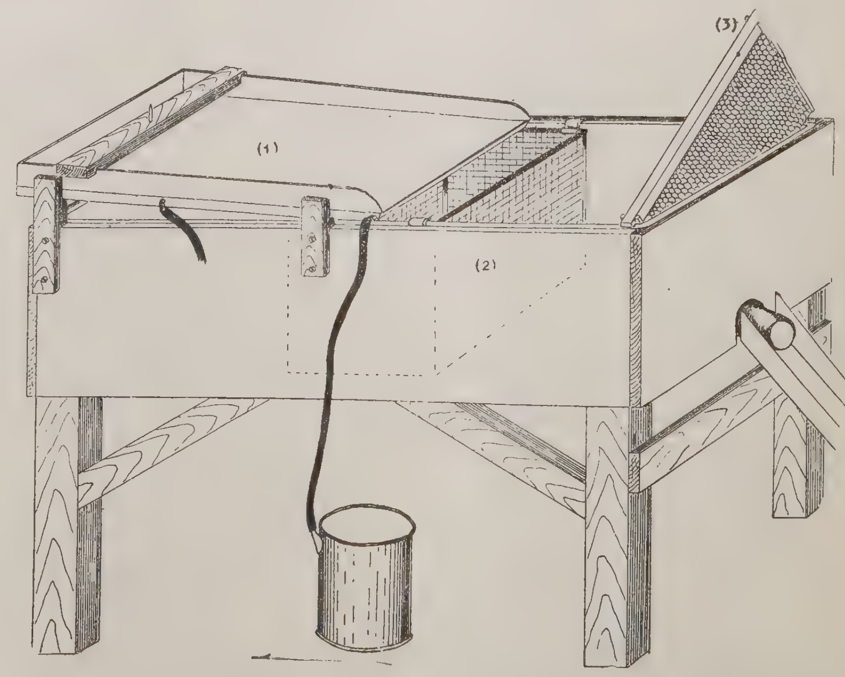
The hot tray is made up of sheet metal, preferably tinned copper, with a steam jacket of about an inch deep soldered on to the bottom. This jacket requires to be brought right down to the edge of the outlet of the tray, otherwise a cold strip will be formed, which will retard the flow of honey and cappings. An inlet tube is set in the side of the steam jacket and is connected to the exhaust tube from the uncapping knife or plane. At the lower end of the jacket is the exhaust tube.

Method of Operation

In the diagram it will be noted that the tray is slightly elevated at the back end to direct the flow of cappings into the basket. The degree of tilt governs the time that the honey and cappings will remain on the tray. As the cappings drop on to the warm tray, the honey immediately becomes less viscous, and when the mass drops into the basket the honey readily separates from the cappings. The purpose of this equipment is not to melt the wax but simply to warm up the honey sufficiently to get the maximum drainage from the cappings. In this way the honey secured shows hardly any signs of darkening in colour and no waxy flavour. After the cappings have been drained for a day or so they can be melted down in the copper, melter, or electric oven. The space at the discharge end of the tank can be used as a holder for the uncapped combs pending extraction.

It should be noted that this piece of equipment does not completely solve the problem of the elimination of the cappings at the same time as extracting is done, but it will reduce the amount of honey retained in the drained cappings without the attendant risk of securing off-flavour or darkening of the honey that passes through the system.

—*C. R. PATERSON, Apiary Instructor, Hamilton.*



G. Uncapping set-up incorporating: 1. Warm plate or tray. 2. Wire baskets for maximum straining of cappings. 3. Holder for uncapped combs.

SPACING FENCING POSTS.

This table is a handy ready reckoner of the posts required at specified spacings for a length of fencing:—

Distance apart.	No. of posts Per chain.	Per mile.
6 ft.	11	880
8 ft.	8.25	660
8 ft. 3 in.	8	640
9 ft.	7.33	587
10 ft.	6.6	528
12 ft.	5.5	440
14 ft.	4.71	377
15 ft.	4.4	352
16 ft.	4.125	330
16 ft. 6in.	4.0	320
18 ft.	3.67	293
20 ft.	3.3	264
22 ft.	3.0	240

Staples—

Post: 1¾ in. x 7 or 1½ in. x 8, 42 staples weigh 1 lb.

Batten: 1 in. x 12, 200 staples weigh 1 lb.

New Zealand Poultry Flock Improvement Plan

THE New Zealand Poultry Flock Improvement Plan has for its main objects:—

(1) **The maintaining and improvement of the health and constitutional vigour of the poultry stock of New Zealand;**

(2) **The maintaining of a reasonable standard of breed type, quality, and size in the poultry of the Dominion; and**

(3) **The maintaining and improvement of the average egg-production of the flocks, thereby improving the economic standard of poultry-farming.**

The plan is conceived as a "long-term" policy, and those interested in it must not anticipate that it will immediately eliminate throughout the Dominion either the presence or the sale of poultry lacking in quality and health. The raising of the standard of our poultry and the reduction of undesirable stock must, of necessity, be a comparatively slow process. Circumstances will not permit making this a compulsory scheme. On the other hand, many poultry-farmers with the good of the industry at heart are convinced that no time should be lost in giving the industry an opportunity of assisting in the maintenance of health and quality in the poultry stock of the Dominion. At the start those responsible for administering the plan will aim to concentrate on:—

1. Health and constitution, with close attention also to—

2. Quality and reasonable type.

3. Improvement in average production. (This will receive greater attention after the war, when labour conditions improve.)

Membership

Membership is on a voluntary basis, and does not entail a fee. Those becoming accredited under the plan will, however, be under definite obligations as set out hereunder, and unless these obligations are honoured in both the letter and the spirit, then the whole object of becoming an accredited member breaks down and the objects of the plan are defeated from the start. The success of the plan and its ultimate benefit to the poultry industry depend to a large extent upon close co-operation between the accredited poultry-farmers and those responsible for administering the plan.

Membership is open to—

(a) **Any poultry-farmer owning not less than fifty (50) breeding females for each breed accredited, whether fowls or ducks,** which satisfy the body responsible for the administration of the plan.

(b) Any person owning a hatchery where all eggs hatched are drawn solely from accredited breeders.

(c) Any person conducting custom hatching in addition to owning poultry may have the latter accredited, providing the hatching eggs from his accredited breeding stock are hatched in a separate incubator, **or** in a hatching compartment containing no eggs accepted for custom hatching, **unless such** eggs are also from an accredited flock.

It is obvious from (c) that no accredited breeder or hatchery-man may undertake custom hatching without prior permission from the administering body. This does not imply that permission will be difficult to obtain, providing the necessary safeguards mentioned above can be put into force.

Disappointment has been expressed by breeders who do not keep as many as fifty breeding birds that they are not eligible for accreditation under the plan. It is hoped that when facilities for administration improve the minimum number of breeding stock required for accreditation purposes will be reduced.

Types of Accreditation

When first placed before poultry-farmers, by means of the poultry Press and broadcasting, it was proposed that there should be two types, or forms, of accreditation. It was never intended that these two types should be looked upon as first- and second-class, or, more correctly, grade I and grade II, thereby unintentionally casting an interpretation of inferiority on the standard of grade II. Both types were intended to give an equal standard of accreditation in respect of quality of the stock concerned, but differed in other respects in regard to the obligations placed upon those accredited under the two types. Further reflection, however, has resulted in a decision to start with only one type of accreditation, namely, "New Zealand Approved Breeding Flock." This will prevent undue confusion in the minds of purchasers of stock until such time as the Poultry Flock Improvement Plan is fully understood and appreciated. For similar reasons it will be simpler for poultry-farmers until the plan is well established. Lastly, it will throw less strain on the administering body, in particular on officers of the Department, during the early stages and while endeavouring to obtain smooth running.

Conditions of Accreditation

All applicants for accreditation under the plan whose flocks are subsequently accepted as New Zealand approved breeding flocks will be expected to conform to the following conditions:—

1. Have all male and female birds intended for breeding purposes blood-tested for pullorum disease. (Only birds which do not react to this test may be subsequently used for breeding, while all birds which react must be sold off the farm within a reasonable and limited period of time after the test. **These "reactors" should be sold for eating purposes only.** No breeding flock will be accredited until, when tested, the number of reactors is found to be under 6 per cent. of the total number of birds tested of any given breed for which accreditation is sought.) (For further details of blood-testing see notes on the subject at the end of this article.)

2. A portion of the pullets may be included for breeding purposes, but not in excess of 25 per cent. of the total number of the approved female breeding stock. (Thus, if a person has a total of 100 female birds for breeding purposes, 25 of these could be pullets, if so desired.)

3. All breeding males and females must scale not less than the following minimum weights:—

	Hens.	Pullets.	Males.
Heavy breeds	6½lb.	6lb.	8lb.
Light breeds ..	5lb.	4½lb.	6lb.

Birds of either sex not scaling these weights would not be eligible for accreditation, and would be barred from being used as breeders in any approved flock.

4. Any egg used for incubation purposes on the farm, or offered for sale as a hatching egg, must be of not less than 2oz. in weight, and be of desirable type for hatching purposes.

5. All breeding birds, both male and female, are to be passed for breed type, health, and constitution by the inspecting or accrediting body before the flock as a whole can be accepted as a New Zealand approved breeding flock. (This is a condition which is open to greater misunderstanding than any other,

and consequently requires some explanation. The main object of the inspecting or accrediting body, described hereafter, will be to—

(a) Exclude any bird which on outward appearance shows signs of ill health;

(b) Exclude any bird which on outward appearance shows any of the generally-accepted signs of lack of constitution; and

(c) Exclude any bird lacking in average type for any given breed, or showing some fault particularly undesirable in a breeding bird, i.e., side-sprigs on the comb, salmon breast in White Leghorns, or feathered legs in a clean leg breed, etc.

It will not be the duty of the inspecting body to judge up to show standards, or to express an opinion upon the type of bird kept, unless the standard of bird is considered too low for accreditation purposes. The main object of that body will be to ensure that all birds are up to weight, are healthy, and are of good constitution.)

6. An accredited breeder desiring to purchase hatching eggs, day-old chicks, or stock for purposes of resale shall do so from another accredited breeder **only**.

Sanitation

No flock will be accredited under the plan where the sanitary conditions on the farm are poor and are, in consequence, considered to be conducive to the spread of disease. This will apply not only to the conditions under which the breeding stock is maintained, but also to the incubator and brooding accommodation, since day-old chicks and growing stock may be sold off the farm or from the hatchery. No hard-and-fast conditions can be laid down in regard to sanitation, but a reasonable interpretation of "satisfactory sanitation conditions" will be taken.

Inspecting Body

For accreditation purposes after an application has been made the body to inspect the farm and stock will consist of two persons—one a representative of the poultry industry and the other an officer of the Department of Agriculture (poultry instructor). After the plan has been established for a year the poultry industry representative will be nominated by the accredited breeders themselves. In practice, accredited breeders will nominate a panel of two or more persons for their district, in order that one may be available when required for inspection purposes. Departmental officers selected for this work will not necessarily be those from the province or district in which they are normally stationed, i.e., a Dunedin poultry instructor might be asked to inspect Canterbury farms and flocks, etc.

Casual inspections without warning, but at reasonable times, will be made by officers of the Department of Agriculture, for the purpose of checking over breeding flocks for health and condition, to check up on the size of hatching eggs being set or sold, and generally to inspect young rearing stock, particularly where the latter is offered for sale.

Inspection is highly necessary and desirable for the successful operation of the plan, but need not be either irksome or officious in nature if the accredited breeder is prepared to co-operate and to meet his obligations under the plan in a straightforward manner.

Publicity

The widest possible publicity will be given to the names of those poultry-farmers becoming accredited under the plan. A list of accredited breeders will be published and will be available for distribution on request to the Poultry Board, Provincial Council, Agricultural College, or the Department of Agriculture. Lists will also be published in the "New Zealand Poultry World" and the "New Zealand Journal of Agriculture." Ultimately, it is hoped to design a registered trade-mark which may be used by accredited breeders on stationery, labels, chick-boxes, etc. In addition, accredited breeders will be required to mark all hatching eggs offered for sale with a rubber stamp specially designed and supplied at cost price to each breeder.

Since in the initial stages of establishing the plan it is intended to have only one form of accreditation—New Zealand Approved Breeding Flock, **any accredited breeder who breeds from hens only** (i.e., female birds which have completed not less than one year of egg-production and which have passed through not less than one full moult) **will have this fact recorded on any published list. Furthermore, any breeder having all the birds on his farm blood-tested and where the results show less than 6 per cent. reactors for the entire flock** will likewise have this fact recorded on published lists.

There is a number of purchasers of hatching eggs, chicks, or stock desirous of buying from flocks where breeding from pullets is not carried out, while others are anxious to take maximum precautions against the introduction of pullorum disease to their farms. The plan will assist both of these to select the breeders offering the type of stock desired, without drawing any undesirable distinction between those breeding from pullets and those breeding from hens only.

Marking Accredited Birds

As soon as circumstances permit all birds accepted for accreditation will be marked by a sealed leg-band. Until such leg-bands again become available accredited birds will be tattooed under the wing. Marking is essential for checking purposes, both for the owner of the flock and for the administering body.

General Administration

The plan will be administered and fostered by specially-appointed representatives of the four provincial councils, in close co-operation with the Department of Agriculture. The co-ordinating body for the Dominion will be the New Zealand Poultry Board. Conditions of administration will be standardised throughout the Dominion, while any changes desirable in the conditions governing the plan will have to be accepted and recommended by a Dominion conference of poultry-farmers. This is highly desirable in the interests of uniformity, and to prevent any tendency to chop and change the policy governing the administration of the plan. Should there be an unexpected breakdown in any provincial coun-

VITAL TO VICTORY

Railways' National Service

In the war's present phase transportation is just as vital to victory as it was two, three, five years ago. Industrial plants, mills, farms, factories — all are united in producing ever-increasing quantities of essential foodstuffs, material and supplies for our Armed Forces and compatriots overseas. The greatest burden of this accelerated wartime industry falls upon Transportation which, in New Zealand, means the Railways. And it is largely because of Railways efficiency and reliability in handling the greatest transportation emergency of all time, that this country's war effort maintains its proud distinction.

Transportation is Half the Battle

cil, the plan will be administered for that province by the Department of Agriculture and the Poultry Board, until such time as control is again established through the usual channels.

Application for Accreditation

This must be made on the prescribed form, which may be obtained from the Provincial Council, Poultry Board, or office of the Department of Agriculture where a poultry instructor is stationed. **These forms must be completed and forwarded to the Department of Agriculture, P.O. Box 3004, Wellington, not later than December 31 of each year, in respect to the following year's accreditation.**

Notice that an accredited breeder wishes to withdraw from the plan must also reach the Department by the same date.

Penalties

Any accredited breeder who after careful investigation by those responsible for administering the plan is found to have deliberately committed a breach of the conditions under which the plan is operated will be liable to have his name removed from the published list of accredited breeders, and readmission under the plan will be at the jurisdiction of the administering body. The final appeal for any such case will be through the New Zealand Poultry Board, with the Department of Agriculture as a coordinated body.

Blood-testing

It will be appreciated that the work connected with the blood-testing of the stock of accredited breeders will be considerable, and must therefore be carefully organised in order that all necessary testing may be completed well before the breeding season.

The following point must be clearly understood, namely, that by applying for accreditation under the plan it is understood that the applicant wishes his stock to be tested, and arrangements will automatically be put in train to do this work. **The applicant will be approached by a poultry instructor, with a view to making the necessary arrangements.** In other words, it will not be necessary for the applicant for accreditation to make further application to have his birds blood-tested. Applicants for accreditation are particularly requested to co-operate as closely as possible with the poultry instructor in the matter of making satisfactory arrangements for blood-testing. Poultry-farmers will assist if they remember that the instructor is forced to work to a programme, and may be able to visit any given district only once for blood-testing work.

The second point of importance applies to the condition that an accredited flock must not give more than 5 per cent. reactors at the final test. In order to comply with this condition, it is likely that some applicants will have to test their birds twice, at a minimum interval of one month. The first test might, for instance, give 8 per cent. of reactors, and the second test would be necessary in order to get under 6 per cent. before accreditation could be granted. Here again, arrangements for the second test will be made with the poultry instructor at the time of carrying out the first test.

Everything possible will be done to assist poultry-farmers in this matter, and to make blood-testing interfere as little as possible with the work of the farms concerned.

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YOUNG FARMERS' CLUBS

Meeting of Dominion Executive Committee

A MEETING of the Dominion Executive Committee was held in the Farmers' Union Rooms, Johnston Street, Wellington, on Friday, October 20. Those present included Messrs. T. E. Streeter (Dominion President), S. G. Avery (Dominion Vice-President), D. S. Ross (Immediate Past President), P. W. Smallfield (Director of the Fields Division, Department of Agriculture), J. M. Smith (Department of Agriculture), D. E. Waide (Auckland Council), M. Donald, J. L. Sunderland, A. D. Young (Wellington Council), J. Barclay, S. A. La Roche (Canterbury Council), W. A. Jacques (Massey College), A. P. O'Shea (N.Z. Farmers' Union), and S. Freeman (Dominion Organising Secretary). Apologies were received from Messrs. C. H. Schwass (hon. treasurer), A. S. Trotter (chairman, Otago-Southland Council), F. S. Atcheson (chairman, Auckland Council), R. W. Wightman (chairman, Canterbury Council), G. Spratt (Auckland Council), B. J. Collerton (Wellington Council), I. Gibb (Canterbury Council), W. King, E. Rabbidge, S. R. Whyte (Otago-Southland Council), and J. H. Bremner (N.Z. Farmers' Union).

The forthcoming Education Conference at Christchurch was discussed. The Vice-President, Mr. S. G. Avery, had been appointed as the federation's delegate, and would be attending the conference the whole of the following week. It was apparent that he had given the matter a great deal of thought and study, and was well qualified to represent the federation. The sub-committee appointed at the annual general meeting had forwarded recommendations on rural education, and these had been incorporated in a pamphlet issued with the agenda of the conference. The recommendations were approved by the meeting, and confidence in Mr. Avery was expressed.

The Hon. C. F. Skinner, Minister of Rehabilitation, had consented to address the meeting, but was unavoidably detained; Mr. E. L. Cullen, M.P., a member of the Rehabilitation Council, attended in his place, and gave some interesting facts and figures connected with rehabilitation. He outlined the complete set-up of the Rehabilitation Council, Board, and local committees, and at the conclusion of his address answered a number of questions.

Department's Full Support

After lunch Mr. J. M. Smith (Department of Agriculture) apologised for Mr. P. W. Smallfield (Director of the Fields Division), who had been prevented from returning to the meeting. Mr. Smith, on behalf of Mr. Smallfield, assured the meeting that the Department was wholeheartedly behind the Young Farmers' Clubs movement. During the war period, on account of staff shortages and other handicaps directly connected with the war effort, it had been extremely difficult for the Department's instructors to give much support to individual clubs or to district committees. Quite a few instructors were overseas—two or three in England—and 33 had been engaged on special work—linen flax and Services Vegetable Production. The position was, however, much brighter, and with the gradual closing down of the vegetable projects, a number of instructors were being released for normal duties. The staff was being built up, and there was also a cadet scheme in operation, all of which would mean that very shortly the Department would again be in a position to extend its full assistance to the Y.F.C. movement.

Referring to the "New Zealand Journal of Agriculture," Mr. Smith said it was the Department's intention to make the "Journal" an even more valuable farming periodical, and constructive criticism and suggestions for the improvement of the Y.F.C. section would be welcomed. He expressed his pleasure at being able to attend the meeting and to be once more associated with the Y.F.C. movement.

The President thanked Mr. Smith, and asked him to convey the federation's appreciation to Mr. Smallfield for the Department's help in the past and the promise of further assistance in the future. He felt sure that the Y.F.C. movement, with the improved outlook and the help of all those associated with it, would from now on forge ahead.

The President expressed regret that there was not a better attendance—unfortunately a number of South Island delegates had been unable to secure accommodation on the ferry, which accounted for there being no representation from Otago-Southland. He was glad, however, to see good representation from other councils. He referred to his recent visits, since the annual general meeting, to Invercargill and the Bay of Plenty; he had attended a meeting of the Otago-Southland Council at Invercargill, followed by a field day and a debate at night, and at Tauranga he had taken part in a meeting of the Auckland Council and attended a combined club

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meeting and also a debate at Paengaroa. He was impressed by the very evident enthusiasm displayed in both of these centres. Since the annual general meeting in July a further 18 clubs had been added to the total—mostly clubs revived, and some newly formed. Considering that we were still at war, this was certainly an achievement, and a good sign for future progress.

Reports were received from the various sub-committees dealing with the Y.F.C. memorial, cultural and aesthetic values, rehabilitation, and increased production. The last-named occasioned considerable discussion, and finally a policy was evolved from the recommendations submitted from both islands. This will be published in circular form and forwarded to all units of the organisation.

The meeting was addressed by Mr. Smithell, Superintendent of Physical Education, Education Department, on the County Badge Scheme. A remit had been forwarded by the Canterbury Council urging the adoption of some such scheme among Y.F.C. members in New Zealand. Mr. Smithell outlined the scheme in operation in England. It was decided that no action in the matter would be taken until the scheme had been submitted to the four councils for their comments and recommendations.

A remit from the Canterbury Council, dealing with the urgency of the problem relating to the spread of nasella tussock, was discussed; on the information that steps were being taken for the eradication of the pest, the remit was carried pro forma. Other remits, in connection with Y.F.C. scholarships and the inter-changing of representatives of clubs during the slack period, were carried.

Post-war Goal

The Organising Secretary said there was a very definite improvement in the position of the movement throughout the Dominion, and a number of clubs had been already revived, besides new ones formed. The outlook for the coming year looked very bright; he urged that all units undertake a campaign in the autumn for the re-establishment of the movement on its pre-war basis. With increased assistance from the Department of Agriculture, and the return of many members from overseas, together with the younger generation growing up in the rural community, he was confident that much could be done. He set the post-war goal at 25,000 members in 800 clubs, and considered that this was by no means impossible within the next few years. Many districts had hardly been touched before the war, so far as thorough organisation was concerned; the field was there, and it was waiting to be exploited. In connection with the Y.F.C. section of the "Journal," he urged that clubs and district committees should send in regular reports of their activities, which were not only of value to other units, but were in themselves excellent propaganda. He deplored the fact that with over 90 clubs at present active and holding regular meetings, he was receiving reports monthly from barely one-third.

Policy was discussed at length, and it was resolved that every effort should be made to revive clubs in recess and to establish new ones. In connection with the "Journal of Agriculture" it was decided to ask the councils to set up sub-committees to consider ways and means to improve the Y.F.C. section and to bring down recommendations at the next meeting of the Executive Committee. It was considered that, with the increasing volume of business, the usual one day of the annual general meeting did not allow sufficient time for complete discussion, and it was decided to place the matter on the agenda for the next meeting.

Y.F.C. Policy to Aid Food Production

THE following points were decided upon at the recent meeting of the Y.F.C. Dominion Executive Committee:—

1. The Y.F.C. Federation, realising the urgent need for increased production of foodstuffs to maintain the existing scale of rationing in Great Britain, and to assist in feeding the starving populations of liberated countries, appeals to all units of its organisation to consider ways and means whereby practical assistance can be rendered.

2. All units of the federation should frame their policy to provide every assistance to Y.F.C. members to increase primary production. To that end the following recommendations are made:

   (a) That all members endeavour to develop their unit, to enable it to carry out to the fullest extent the aims and objects of the Y.F.C. movement.

   (b) That all clubs endeavour to hold regular meetings, at which lectures, instruction, and discussion can be arranged with a direct bearing on increased production.

   (c) That every consideration be given to the holding of field days with a view to providing practical instruction on subjects relative to production.

   (d) That all district committees and councils conduct a survey of available talent in the way of lecturers and demonstrators in their respective areas, and advise the various units to which such lecturers, etc., are available.

   (e) That all district committees give consideration to the fostering of inter-club competitions and field days to the fullest extent that prevailing conditions will permit.

   (f) That all members make every possible effort to avail themselves of the facilities afforded by the Y.F.C. to expand their knowledge, in order that they may improve their farming practice and increase production generally. A close study of the material in the monthly issues of the "Journal of Agriculture" is strongly recommended; members should also take the fullest advantage of the services offered by the Department.

3. In order that the recommendations embodied in (2) may be implemented, councils should undertake a survey of the units within their areas, with the idea of improving the link between clubs, district committees, and councils, and to obtain more complete representation at meetings.

4. That councils investigate the financial position of each of its district committees, and endeavour to ensure that they are not curbed in any activity they may wish to undertake, such as field days, organised lecture tours, competitions, etc.; and that councils consider the expenditure, if necessary, of funds in order to promote activities having a direct bearing on increased production, such as the sponsoring of series of instructive talks over the radio—in the form of a Y.F.C. session if possible—and the payment of travelling expenses of lecturers and demonstrators to various centres when necessary.

Western Southland Field Day and Debates

THE annual combined field day of the Western Southland District Young Farmers' Club was held recently, when an interesting and instructive programme was carried out for the benefit of a large party of club members. The first visit was to the city gasworks, and this was followed by inspections of a city pumping station,

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a concrete products works, the carpentry and engineering workshops of the Southland Technical College, and the factory of the Disabled Soldiers' Products. At this stage the party was given afternoon tea in the U.F.S. Hall, and then a short series of educational films was shown by the courtesy of the Automobile Association of Southland. As a meeting of the Otago-Southland Y.F.C. Council was held during the morning the size of the party was considerably larger in the afternoon.

In the evening the annual inter-club debates were held, and it was generally conceded that the debating was better and brighter than at any of the previous annual fixtures. Four teams, from the Wyndham, Woodlands, Orepuki, and Technical College Clubs, entered the contest, and the high light of the evening was the splendid performance of the youthful members of the college club. The judge, Mr. J. C. Prain, awarded the winning points to the Southland Technical College team, and congratulated them on their performance. This club will now hold for the ensuing year the cup presented by the Women's Division of the Farmers' Union.

Obituary

Mr. H. J. Lancaster

THE death was announced recently of Mr. H. J. Lancaster, Glen Oroua, aged 67. Mr. Lancaster was well known in Jersey cattle circles as one of New Zealand's most prominent stud breeders. He was for a number of years an accredited classifier of the New Zealand Jersey Cattle Breeders' Association, and carried out some fine work throughout the Dominion in that connection.

Up to the time of his death Mr. Lancaster took an active part in the Y.F.C. movement, and contributed considerably to the progress of the organisation, both in his own district and throughout the Wellington Council area. In addition to being Advisory President of the Rongotea Y.F.C., one of the pioneer clubs in the Manawatu, from its formation in 1935, he was also a member of the Wellington Y.F.C. Council since its inception in 1938, and attended various Dominion Executive Committee and annual general meetings of the federation over a number of years.

He was most unselfish in his assistance to all units of the Y.F.C. organisation, travelling long distances on many occasions to demonstrate and judge at club and district field days, and his kindness and hospitality to visiting members was well known. The Rongotea Club has lost a leader and a friend, who will be sadly missed by the Y.F.C. movement generally. On behalf of all Y.F.C. members we extend the most heartfelt sympathy to his relatives.

Wanganui District Debating Contest

(By Malcolm F. Gray, Hon. Secretary, Marton Y.F.C.)

ALTHOUGH rather late in the season, it was decided by the Wanganui District Committee, which met in Mangaweka early in July, to hold the contest this year in both senior and junior sections; it was last held three years ago. Because of travelling difficulties the district was divided into two zones, the northern comprising the Taihape, Taihape D.H.S., and Mangaweka Clubs, and the southern the Marton, Bulls, and Ohakea Clubs. In the northern zone Mangaweka was the only club to enter a team—a senior one—and so they did no debating until the final. The position was very different down in the south; Bulls entered two senior and two junior teams and Marton two senior and one junior. Ohakea were unable to raise a team, and at the last minute Bulls had to withdraw one of their junior teams.

The standard of debating was high all through the contest, and congratulations go to the Marton senior A team in winning the senior trophy for their club and to the Bulls juniors for winning the junior trophy.

The first round was run in two sections, the first being held in Clifton Hall, Bulls, on Wednesday evening, August 23. The subject, which was the same for the whole of the first round, was: "That the Practical Farmer Has Contributed More Towards the Advancement of Agriculture than Has the Scientist." For the senior A division, Marton (M. F. Gray, H. R. Miller, and K. G. Coles) opposed the motion and had a comfortable win over Bulls (S. G. Avery, C. Palmer, and C. Mullin). H. R. Miller was adjudged the best speaker, and S. G. Avery was particularly praised for his criticism in his reply, which "tore the negative to pieces." After supper had been served the junior contest was held. Marton (G. E. Gordon, A. I. Morrison, and A. L. Vile) supported the motion, and were narrowly defeated by Bulls (F. Jurgens, K. Stewart, and D. Mitchell). Mr. A. D. Young was chairman and timekeeper, and Mr. K. W. Dalrymple the adjudicator.

The second section was held in the Marton Jockey Club's rooms on Wednesday, August 30, when the senior B teams from both clubs met. Bulls (R. I. Jamieson, F. Thorby, and H. Clark) opposed the motion and defeated Marton (G. R. Gower, K. H. Smith, and G. O. Mayer) by the narrow margin of 31 points. The teams were never slow to support their contentions and many spirited arguments developed, which caused no little amusement to the rest of the meeting. Mr. K. G. Coles was chairman and timekeeper and the adjudicator, Mr. K. A. Williams, judged R. I. Jamieson and F. Thorby the best speakers. His criticism of the speakers and advice on debating generally were very much appreciated. Supper was arranged by the Marton Club. All the teams in this round, with the possible exception of the Bulls juniors, found that the subject was one where it was very easy to find too much to say in the time allotted. This is quite understandable, for agricultural research covers a very wide field and many aspects of it were brought up.

The second round, which was the final in the southern zone and the semi-final for the district, was held in Clifton Hall, Bulls, on Wednesday, September 20. The subject was "That Straight-out Grassland Farming is More Economic than Grassland Farming Supplemented with Cropping." Marton Senior A (M. F. Gray, K. G. Coles, and H. R. Miller) again drew the negative and defeated Bulls senior B (R. I. Jamieson, H. Clark, and F. Thorby); the points were: Marton 279, Bulls 265. Here again speakers were troubled with too much to say and not sufficient time in which to say it. After a comparatively tame start interjections flowed freely towards the finish, and considerable laughter showed the friendly spirit of rivalry which existed. Mr. P. Anderson was in the chair and Mr. S. G. Avery timekeeper. Mr. F. T. Harper adjudged F. Thorby the best speaker, and after he had announced his decision and criticised the speakers, he gave a very good summary of the subject as well as many suggestions to the Bulls team on how they might have handled the subject with considerable advantage. Supper provided by the Bulls Club brought a most enjoyable evening to a close.

The final was held in St. Andrew's Hall, Marton, on Friday, October 27, between Marton and Mangaweka. The subject on this occasion was one which has probably not previously been debated in a Y.F.C. contest—"That Environment is of Greater Importance to the Individual Animal than is Heredity." For the first time in the contest the Marton team drew the affirmative, and, after a very good debate in which there was little to choose between the teams, won by the margin of 23 points. Marton (M. F. Gray, H. R. Miller, and K. G. Coles) scored 290 points out of a possible 400, and Mangaweka (P. Green, J. R. Dalrymple, and N. Weston) 267. In spite of the highly controversial nature of the subject, interjections were not frequent, due possibly to the fact that the speakers were not altogether sure of the ground on which they were treading. Many interesting points were raised by both sides, and at the conclusion the general opinion was that feeding and breeding go hand in hand; you cannot have one without the other. Mr. A. C. Birch was chairman and Mr. F. T. Harper timekeeper. Mr. K. A. Williams was the judge and congratulated M. F. Gray on his closing speech, which practically won the debate, for until the summaries only 11 points separated the teams. Marton thus got some of their own back after their "slathering" at the hands of S. G. Avery in the first round. Supper, served by the Marton Club, concluded an enjoyable and enlightening evening.

The subjects have been most instructive and the teams concerned have all learnt more about various aspects of farming than they knew before, and for this reason, if for no other, such debates deserve all the encouragement possible. The chief difficulty usually experienced is to make members sufficiently interested to take part; it is hoped that it will be possible to hold the contest each year in future, as was the case before the war. In that case debating should gain much wider publicity among club members in general.

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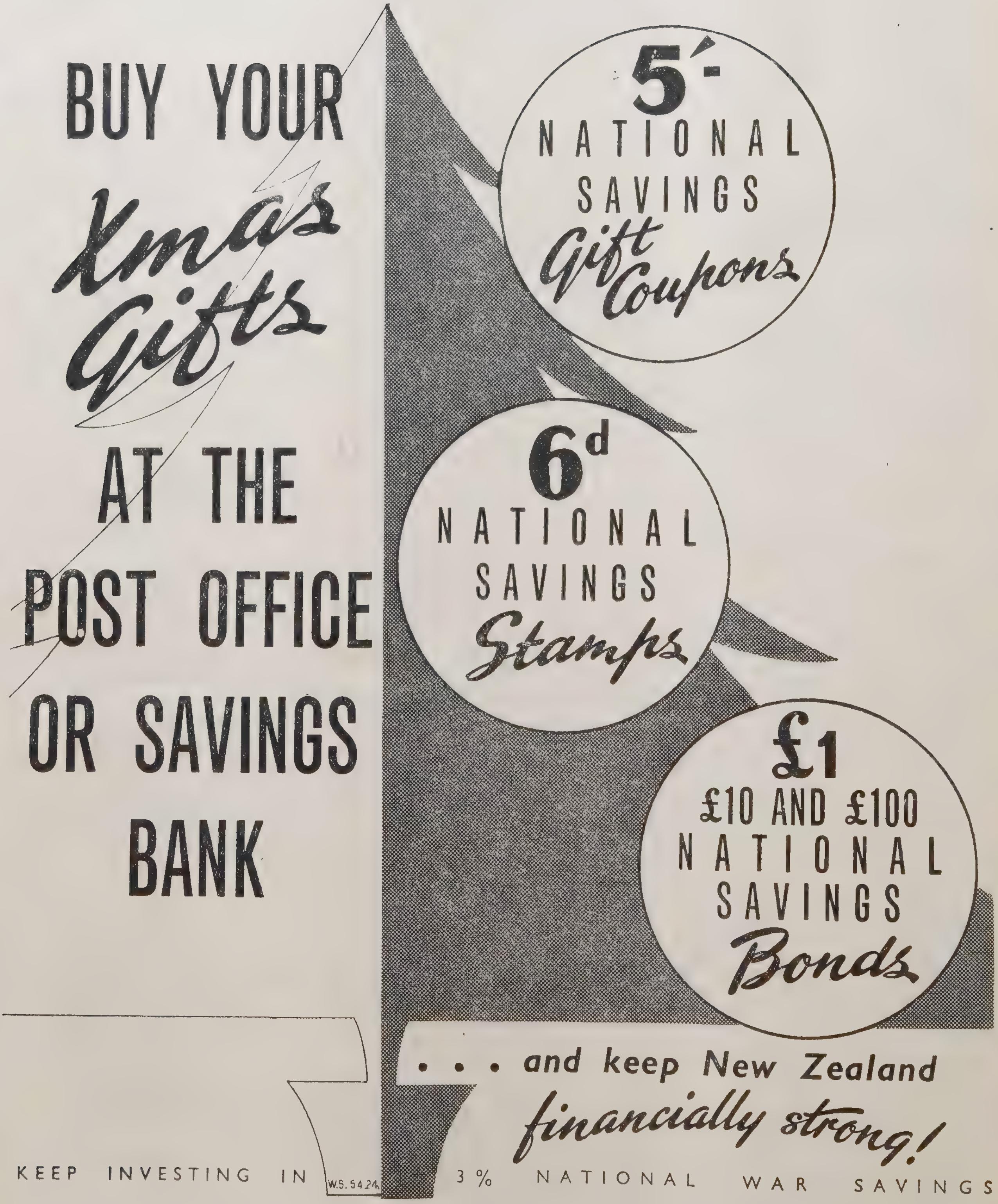

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Reports on Club Activities

WESTERN SOUTHLAND.

Dipton.—Business meeting. Arrangements made for operating of bank account. Accounts passed for payment. General discussion regarding the prices received by the farmer for his produce. Attendance of eight members out of a total of 16.

Orepuki.—Lectures at recent meetings included an address by Gunner G. Stuck on his "Experiences in the Pacific," and a lecture by Mr. A. S. Helm, of Riverton, on "Insurance." Attendances of 14 and 18 out of a total of 35.

Southland Technical College.—Short prepared talks by club members as follows:—W. Hall ("Linnaeus"), J. Bennett ("Feeding and Rearing Calves"), F. Hamill ("Poisonous Plants on the Farm"), G. Cooney ("Arthritis in Lambs"), R. Sycamore ("Soldering"), D. Stronach ("Blue Lupin for Fattening Lambs"), C. Beker ("Development of Third-class Land in Southland"), K. Chalmers ("Breaking in Horses"). Sixty members present out of 78. Fifty-six members attended a field day consisting of a visit to Seaward Bush; during the day a short lecture on the botany of the bush was given by Mr. McKinnon.

EASTERN SOUTHLAND.

Five Rivers.—Two new members enrolled. Talks on the field days at Gore and Invercargill were given by D. Muir, R. W. Muir, and P. E. Muir. D. Muir also spoke on the Southland Technical College workshop. Eleven members present out of 23.

SOUTH OTAGO.

Warepa.—Decided to procure a drum of weed-killer to use on the weeds in the Warepa cemetery. Memorial trees planted to commemorate two members killed on active service. Talk by Mr. S. Taylor on "The Maintenance of a Motor-car Engine." Eighteen present out of 28.

DUNEDIN.

Mosgiel District High School.—Decided to hold a social. A social committee appointed consisting of L. Robertson, P. Jackson, E. Webb, and M. Pickering. P. Jackson was elected to the position of club secretary, which had become vacant. Discussion took place on the Lincoln College Old Students' Association scholarship. A visit to the Mosgiel Woollen Mills to be arranged. Fourteen members present out of 17.

West Taieri.—General business. Impromptu speeches by club members. Six present out of a total membership of 17.

NORTH OTAGO.

Enfield.—Welcome to W. Hellewell and J. Bullock, members returned from the Pacific area. The chairman wished the best of luck to the seven members who had been accepted for the Roxburgh Shearing School. Committee appointed to make arrangements for a picnic and dance on Boxing Day. A very interesting talk was given by Mr. W. Smedley on "Fallow and Red Deer"; the speaker, who had worked for two years as a Government deer culler, dealt in detail with the whole growing life of the deer, and also described the correct methods of stalking deer. Eighteen members present out of 20.

SOUTH CANTERBURY.

Geraldine.—One new member enrolled. Cricket matches to be held against Geraldine Cricket Club and also against the High School. Talk on "Sawmilling on the West Coast" by Mr. Z. O. Sherratt. Seventeen members present out of 36.

MID-CANTERBURY.

Ashburton District High School.—Report given by the secretary on the recent meeting of the Mid-Canterbury District Y.F.C. Committee. Interesting talk on "Diseases of Sheep," by Mr. J. Gibson, Department of Agriculture. Decided that at next meeting each member should give a five-minute talk on any subject of interest.

Hinds.—Report by secretary on the recent Mid-Canterbury District Committee. Arrangements made for members to attend the annual district inter-club stock-judging competition. Decided to hold another dance. Lecture on "Plant Genetics," by Mr. G. K. McPherson, Department of Agriculture; he also gave a display of seeds under the microscope and answered many questions. Seventeen members present out of 20.

Methven.—One new member enrolled. Reports of the recent meetings of the Mid-Canterbury District Y.F.C. Committee and the Methven Farmers' Union given respectively by R. Wightman and A. McKay. Presentations to two members going overseas. Decided to invite someone to give a talk at the next meeting on "Pasture Judging." A mock meeting was held during the evening, the club acting as the "Methven Beautifying Association," with G. Limbrick as chairman and J. Dixon as secretary. A very interesting lecture was also given by Mr. M. C. Milne entitled "Farming in South Otago"; the speaker dealt very fully with his subject, and answered a number of questions. There were 12 members present out of a total of 70.

NORTH CANTERBURY.

Scargill-Omihi.—Field day on Mr. D. S. McKenzie's property, "Happy Valley." Demonstrations were given on the black poll stud herd and the Romney stud flock by Messrs. C. and W. McKenzie respectively; both gentlemen later explained the Munro topdresser, and inspections were made of the machinery generally. Some time was also profitably spent in examining the pastures, and the lime works were visited. There was an attendance of 20 club members and approximately 30 older farmers and others interested.

MARLBOROUGH.

Seddon.—Lincoln College Old Students' scholarship discussed. Decided to hold a field day and shearing competition; committee appointed, as follows, to make full arrangements: N. Gee, M. Casey, K. Dysart, and H. Gluyas. Club dance to be held. Lecture by Mr. E. Reid on "Nasella Tussock"; the speaker exhibited pieces of the tussock, and explained, among other things, that grubbing is the best method of eradication, burning having little effect, unless it is carried out every three weeks. A hearty vote of thanks was accorded to Mr. Reid by a very attentive audience. There was an attendance of 17 members out of 26, as well as 30 interested non-members.

WAIRARAPA.

Carterton.—A letter expressing appreciation of the gifts forwarded by the club was received from H. Staples, a member overseas. Two returned members, B. Swinn and M. Knutson, related some of their experiences in the Pacific. Final arrangements for the debate to be held against Masterton Y.F.C.; teams selected: Senior, B. L. Brassell, P. Gates, and B. McKenzie; junior, D. Bassett, F. Fell, and J. Jones. M. Knutson, P. Swinn, and M. A. Fisher elected honorary members. B. Card appointed as club librarian. There was an attendance of 19 members.

Masterton.—Arrangements for the club's annual ball. Member nominated for the Lincoln College Old Students' scholarship. The evening was concluded in a very interesting manner, constructive criticism being given to both the senior and junior debating teams. There was an attendance of 33 out of a total of 70.

MANAWATU.

Bunnythorpe.—Decided to stage a section at the Women's Institute Show in February, and to invite members of the Whakarongo Club to take part; the following classes to be exhibited —Potatoes (Sutton's Supreme), peas, marrows, carrots (Early Horn), parsnips, tomatoes, turnips, and beetroot (one variety of each). Prize money to be 8s. in each class; a special prize of 5s. was donated by Messrs. J. Wood and T. Hyde for the Y.F.C. member gaining most points in the show. An attendance of six members.

Pohangina Valley.—Member nominated for the Lincoln College Old Students' scholarship. Mr. J. Linklater reported that the club's gymnasium equipment had been destroyed by fire. Lecture by Mr. J. A. McDonell on the subject of "Bookkeeping." Nineteen members present out of 22.

Rongotea.—One new member enrolled. Final arrangements for dance. The members attended an address given by Mr. B. V. Cooksley on "The Farmers' Federation." Eighteen members present out of 23. At the previous meeting a social committee was set up, and Ron. Hill was nominated to attend the district com-

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mittee meeting. A lecture entitled "The Home Garden and Orchard" was given by Mr. A. J. Cederman, Department of Agriculture. Twenty members attended this meeting.

Whakarongo.—It was decided that members should write to fellow-members overseas, sending them Christmas greetings. Arrangements for the speaker for the next meeting. Address by Mr. J. Linklater on "The Conduct of Meetings" and "Parliamentary Procedure." Nineteen members attended out of a total of 20.

WANGANUI.

Bulls.—A report on the recent meeting of the Wanganui district committee was given by the secretary, I. Jamieson, who also drew attention to the final of the district debating contest between Marton and Mangaweka Clubs, to be held at Marton; it was considered desirable that members should make an effort to be present. Discussion regarding the Lincoln College Old Students' scholarship. A very interesting talk was given by Pilot Officer R. G. Dunford on his experiences abroad whilst serving with the R.N.Z.A.F. His travel talk included the Pacific Islands, Canada, U.S.A., Scotland, and England, and operational duty with Bomber Command over occupied country. Twelve members present.

Marton.—Report on annual dance—profit of £3 17s. Report on final of district debating contest; votes of thanks accorded to Messrs. C. Amadio, K. A. Williams, F. T. Harper, and G. McDonald for help given to debating teams. Decided to send Christmas parcels to all members serving overseas. Field day to be held early in January in order to select teams for stock-judging competition to be scheduled at the Marton A. and P. Show. Also decided to approach the Hunterville Club regarding the possibility of holding a sports meeting. Three new members enrolled. Address entitled "The Care and Maintenance of Farm Machinery" given by Mr. V. W. Fullerton-Smith, of Marton. Twenty-three members present out of 37.

SOUTHERN HAWKE'S BAY.

Dannevirke.—Discussion on Lincoln College Old Students' scholarship. A. and P. Association to be asked to again include the Y.F.C. classes in its show schedule for February. The secretary, J. L. Sunderland, gave a short report on the recent meeting of the Wellington Council. Mr. L. Feierabend reported briefly on the activities of the Farmers' Union gift stock committee. Short talk given by G. Crosse on "Sleeping Sickness in Sheep." The next meeting to be the final of the short talks, and an outside judge to be present. Mr. R. J. MacDonald gave an interesting talk on "Sheep Dogs"; he outlined the breeding, rearing, training, feeding, and working of dogs. There was an attendance of 21 members.

Mangatainoka.—Field day to be arranged. Member nominated for the Lincoln College Old Students' scholarship. One new member enrolled. A lecture on "Seeds and Grasses" was given by Mr. T. Richardson. Ten members attended out of a total of 18; a large number of visitors were also present.

NORTHERN HAWKE'S BAY.

Meeanee.—Notice regarding Wellington Council meeting. Discussion on Lincoln College Old Students' scholarship. Informal talks delivered by members occupied the rest of the evening. Nine members present out of 20. At the previous meeting one new member was enrolled. Talk by Mr. F. J. Steele on the work done by the Hastings Primary Production Council. Eight members present.

Wairoa.—Talk by Mr. F. Mardon, of Messrs. Swift's (N.Z.), Ltd., on the subject of "Fat Lambs." Mr. Mardon has inaugurated the first fat lamb competition for Y.F.C. members, each member to be allowed to enter two pens of three lambs each. Messrs. Swift's have kindly donated the prize-money, and the Government grader will lecture members on points connected with picking lambs. It is considered that at least 20 pens of lambs will be entered. Mr. G. F. S. Hudson, inspector of stock, Wairoa, gave a talk on "The Vaccination of Calves Against Abortion," and answered many questions. At the close of Mr. Hudson's address the chairman, on behalf of the club, congratulated him on his promotion, and wished him success; he also thanked him for all that he had done for the club in the past. Mr. Hudson, who has been a vice-president of the Wairoa Club since 1937, suitably replied. There were 23 members present.

TE KUITI.

Otorohanga.—Final arrangements for field day and for birthday dance. Interesting and lively discussion on the Lincoln College Old Students' Association scholarship; it was found that there were no members present who could avail themselves of the opportunity just now. Two members gave reports of their visit to Ruakura Animal Research Station, artificial insemination being their main interest. There were 20 members present at the meeting, out of a total of 27.

Paewhenua.—General business. Prepared talks by all members present. Attendance of 15 out of 21.

Te Anga Central.—We are pleased to record that this club has now resumed activities, with a membership of 15. It is hoped to be able to give more news of its activities next month.

WAIKATO.

Cambridge.—The chairman reported on the lecture recently given by Dr. McMeekan on "Artificial Insemination and Herd Improvement" to a combined gathering of over 100 club members and local farmers. It was decided to hold a New Year's Eve dance again this year. Address by Mr. W. Perrot on "Poultry Keeping as a Sideline." Twenty members present out of 60.

Te Awamutu.—Committee appointed in connection with a debate to be held at the next meeting. A general committee was also set up to discuss the proposed memorial to members who have given their lives overseas. A very interesting address was given by Mr. S. Wanklyn, local manager of the Bank of New Zealand, on "Farm Finance"; much information was obtained and many questions were answered. There was an attendance of 32 members out of 57. At the previous meeting it was decided to donate a £10 war bond to the local branch of the W.D.F.U. in appreciation of the great assistance rendered by them on the occasion of the recent Y.F.C. dance. It was moved that copies of the "Journal of Agriculture" be sent to members overseas. Mr. S. Smith, of Paterangi, gave a very interesting address on "Grassland Development," and passed on a great deal of information gained by him during a lifetime of practical farming. Twenty-nine members present.

Te Pahu.—Discussion on the possibilities of a field day at Ruakura Animal Research Station. A sports committee and a social committee were set up. Arrangements made for a dance. An address on "How to Conduct a Meeting" was delivered by Mr. Kelp; the speaker gave the meeting some very inteersting information on the subject, and it is understood that members profited greatly by his talk. This young club is making good progress, and we wish it every success. There were 16 members present out of a total of 23.

BAY OF PLENTY.

Kati Kati.—General business. Prepared speeches by all members present, a very high standard being attained. Decided to hold a dance in the near future. One new member enrolled. Seven members present out of 25.

Paengaroa.—Arrangements finalised for the annual dance. General discussion on points of interest to all club members. An interesting and instructive talk on "Calf Rearing" was given by Mr. I. W. Rowe. Attendance of 13 members out of 46.

Te Puke.—T. Diprose elected chairman for the remainder of the year. Arrangements for a field day. Mr. Bathgate, a taxation specialist, gave a very interesting and instructive talk on "Taxation." Fourteen members present out of 24.

Welcome Bay.—This club, the inauguration of which was reported in last month's notes, was fortunate at its second meeting to have present Messrs. D. S. Ross (Immediate Past President of the Y.F.C. Federation), P. Nichol, and G. Spratt, chairman and secretary respectively of the Western Bay of Plenty District Committee, who were welcomed by the club chairman, J. R. Wright. After the general business of the meeting Mr. Ross addressed members on the Y.F.C. movement throughout the Dominion, and Mr. Nichol spoke on the activities of the clubs in the Western Bay of Plenty district. They were accorded a hearty vote of thanks. Mr. Hammond, of Papamoa, was appointed as advisory president to the club. Arrangements for a dance in the near future. Three new members enrolled. We wish this new club the same amount of success that has attended the efforts of all other clubs in the Bay.

Whakatane District High School.—Mr. Hubbard, advisory president, gave an interesting talk on "The Science of Bee-raising," and answered many questions. As the coming school certificate examinations would prevent R. Law from carrying out his secretarial duties for the next few weeks, A. Mundy was appointed acting secretary. Six members were selected to take part in the debate, "Baling v. Stacking," to be held at the next meeting. Thirty-one members in attendance.

AUCKLAND.

East Tamaki.—Social committee appointed. Arrangements for a field day to consist of a visit to MacEwen's and Booth MacDonald's factories. Address by Mr. W. Alexander on "Grassland Management," followed by questions and general discussion. Twenty-nine members present out of 33.

Pukekawa.—Decided to present the School Calf Club with two consolation prizes to the value of £2. An open meeting to be held during the month on the occasion of a lecture by Dr. Segar on "Veterinary Work." Mr. L. Cathcart gave an interesting talk on "The Handling of a Young Horse." Nineteen members present out of 23. A field day was held on Mr. E. Morrison's property; Mr. Jones, of Pukekohe, lectured and demonstrated on the points of a dairy cow, and on the care and getting up of a calf for Calf Club day. There was a large attendance of club members, visitors, and school children.

NORTH AUCKLAND.

Kaukapakapa.—Arrangements for a field day on Mr. J. B. Hooper's property. A Y.F.C. decorated float to be exhibited at the Helensville A. and P. Show. Address by Mr. F. S. Atcheson, chairman of the Auckland Y.F.C. Council, on "The Aims and Objects of the Y.F.C. Movement." Attendance of 16 members out of a total of 50.

Whirinaki.—A basket social held to raise funds for the requirements of the club; the sum of £17 16s raised, bringing the total amount in hand to £36 6s 6d. The club's experimental plot was planted with the following: (1) Black Valentine beans; (2) carrots; (3) parsnips; (4) leeks; (5) four rows of potatoes (Inverness Favourite, Arran Chief, Majestic, and Arran Banner); (6) sugar beet. The crops were sown with three treatments—super, super-potash, and no manure as a control.

CORRECTION.

The name of the contributor of the first article in last month's Y.F.C. notes, "How a Young Farmers' Club was Revived," appeared, through a typographical error, as Mr. I. G. Taylor. Mr. I. G. Tabor was the author, and apology is made for the mistake in printing his name.

LIME REQUIREMENTS OF SOIL.

The principles underlying the determination of the lime requirements of soils are discussed in an article by Dr. E. B. Davies appearing on page 529 of this issue. Young farmers should find much of interest in the author's treatment of a subject of first importance in the agricultural welfare of this country.

THE GOOD NEIGHBOUR

The Christmas Message

"Behold, I bring you good tidings of great joy, which shall be unto all people for unto you is born this day a Saviour, which is Christ the Lord. Ye shall find the Babe wrapped in swaddling clothes, lying in a manger." And suddenly there was with the angel a multitude of the heavenly host praising God and saying, "Glory to God in the highest, and on earth peace, goodwill toward men."

MANY centuries have passed since the Angel of the Lord proclaimed the birth of the Christ-child to the shepherds keeping watch over their flocks on Judah's starlit hills, yet the story of that first Christmas still has the same power to move our hearts. As we ponder the Christmas message, told with such simplicity and beauty, the cloak of our everyday materialism slips from our shoulders, leaving us humble and reverent before the miracle of the nativity. But the twin spectres of grief and suffering have crossed the threshold of so many homes in recent years, and left a trail of bitterness and unbelief in their wake—

"There are no candles here, we said, no laughter,
No pine trees standing tall in sifting snow.
This is the real; the hours we used to know
Are now the dreams. . . . If there is birth,
How can we feel it here where faith lies dead?
Must we pretend that there is peace, we said,
When war lies black upon a broken earth?"

Have the outward symbols—the decorations, the carols, and gifts—become meaningless trappings? Is it agony to remember other happier Christmases when those we loved were here to share our joy? Christianity has not failed mankind: it is we who have not heeded the Divine precepts.

"What did we know of Christmas, we who thought
That lights could always burn and sleigh bells ring?
This is the real, we said, so we must sing
And build the faith anew. When we have fought
And won our peace, men will recall the song
We sang at evening when the lights were dead.
This much is ours alone to give, we said,

AND WE SHALL SEEK THE STAR AND NOT GO WRONG."

Those of you who are sorrowing and dispirited take comfort from the thought that Christmas Day is a birthday, a day of new beginnings, of hope and looking forward. Countless thousands have given their lives that freedom and truth and love shall prevail. And though the battle still continues and the final victory has yet to be won, signs are clearly visible that out of all the misery and destruction some recompense of good is emerging. Just as the bombing has destroyed many squalid slum areas and clean, new buildings will rise in their place, so the barriers of false pride and class distinctions are breaking down, giving rise to fresh ideas in neighbourliness, in education and social justice. Wonderful discoveries have been made in the realms of medicine and science which will be of incalculable benefit to humanity. That great statesman, Jan Smuts, speaks of "a great hope and vision of a peaceful, ordered human society, steadily moving forward to the attainment of the high social and spiritual ideals which have been the inspiration of the greatest spirits of our race."

There is only one way in which this can come about, and that is by living in accordance with the standards of Christ. Fay Inchfawn, in one of her poems, says:

"When that wondrous little Stranger
Lay and slumbered in a manger,
Did small Bethlehem folk begin
To come gently stealing in,
Asking softly as they came,
'What will be the Baby's name?'
Then did Mary, mother-wise,
Untold memories in her eyes,
Tell those small folk who came,
'Saviour, Saviour—is His name.'
From our griefs we turn aside,
Seeking Thee this Christmastide,
With one hope and but one claim:
'Saviour, Saviour, is Thy name!'"

Let us not hesitate to carry out the resolution she expresses in her closing verse.

Mary

OUR GLAMOUR'S ONLY A GLIMMER NOW—BUT WAIT!

Tantalizing! Beside this pre-war glamour, Berlei beauty now is only a glimmer. Severe—but necessary—regulations of the Standards Institute govern how much time, labour and rubber may go into any one corset.

Thank you, lovely ladies all, for bearing with our present shortcomings. As soon as restrictions lift, Berlei will dazzle your beauty-loving eyes again.

A Berlei executive is in America now, investigating the synthetic rubber and fabric situation. We're all set to pick up where we left off—at nylon, remember? When the whistle blows, we'll shower you, overpower you with lovely limber Berleis beyond your dreams. We'll have you looking your most beautiful for "him" to come home to. It's a promise!

GLAMOUR · 1939

Berlei
TRUE-TO-TYPE FOUNDATIONS

And a Star Shone Down

(By BETTY MAITLAND)

THREE kings rode afar. The first was tall, on a tall white horse. He rode a little apart, and silently, for he was a great monarch and proud. On his hands were many precious stones, and in his eyes a great loneliness. Gold he bore and treasures, upon his saddle and in his trappings.

AND A STAR SHONE DOWN.

Unheeding rode the second king, his beautiful mare stepping delicately. His hands were as sensitive as a maiden's, his face the face of a dreamer. Ever and again he would smile at the sayings of the youngest king, but in reality he was listening with scant attention. The thoughts of his own mind wheeled like birds in his consciousness.

AND A STAR SHONE DOWN.

Youth rode upon the third horse. Youth with laughter and quick speech and a fine impatience. Youth with a strong wrist and a keen eye and the eagerness of living leaping within him. Before him on the saddle he bore a little strange casket, sealed with an unbroken seal.

AND A STAR SHONE DOWN.

Anon they came to the stable. A mother bent her head in greeting and a Child watched with solemn eyes. "Madonna . . ." The first king knelt, his greatness forgotten, and gold dropped into the mother's lap. Tears fell from his proud old eyes, but the loneliness in him was gone.

The second king knelt. "To your Child I bring the beauty of holiness and the gift of solitude. . . ." There was quiet in the stable. Perfume hung in the air, and a great peace. . . .

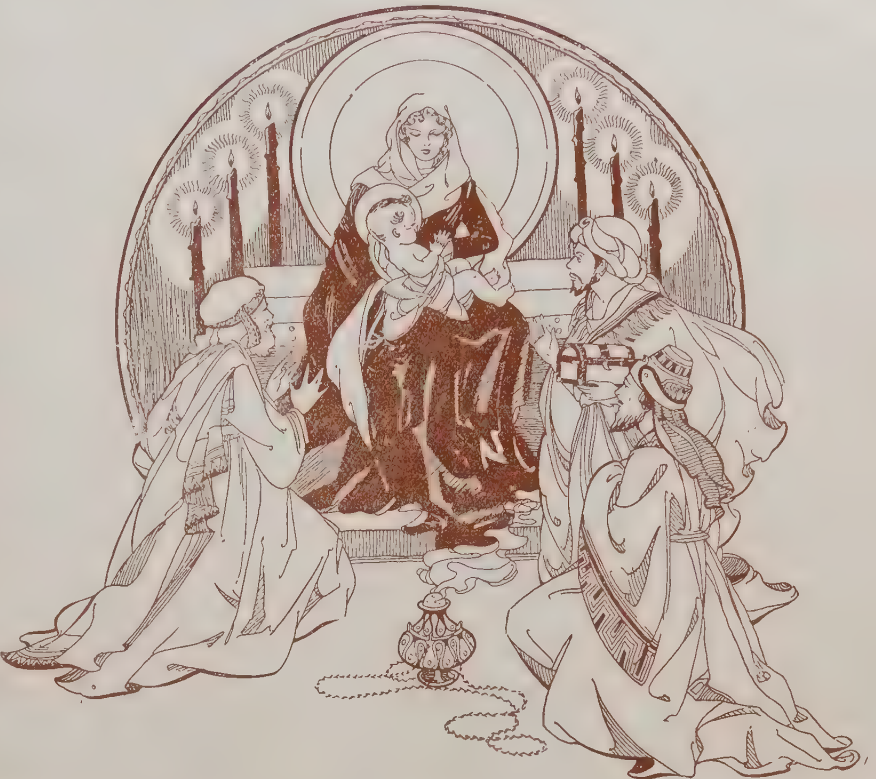
The third king stumbled forward and laid his casket on the Child's knee. "Open it," he said eagerly. "I give it Thee . . . with myself. . . ."

The lid fell back. Sorrow and pain, loneliness and a great bitterness lay within. The young king fell upon his knees. "I did not know—I did not know," he cried. In his voice was bewilderment and a vast desolation. Mary, the Mother, put the casket sadly aside.

But the Child arose. The gold and the treasures tumbled upon the floor. The perfume swept out of the stable upon the cool night air. The Child took the casket and smiled at the youngest king. After a long while the youngest king smiled back. . . .

Again there was quiet in the stable and a great peace.

AND A STAR SHONE DOWN.



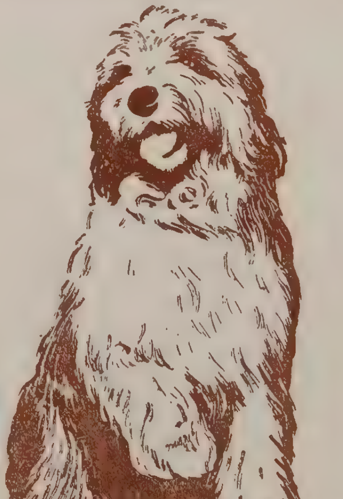
THE LITTLE WHITE DOG

I wonder if Christ had a little white dog
  All curly and woolly like mine.
With two long silk ears, and a nose, round and wet,
  And two eyes, brown and tender, that shine.

I am sure if He had that that little white dog
  Knew right from the first, He was God;
That he needed no proof that Christ was Divine,
  And just worshipped the ground where He trod.

I'm afraid that He hadn't, because I have read
  How He prayed in the garden alone;
For all of His friends and disciples had fled—
  Even Peter, the one called a stone.

And oh, I am sure that that little white dog
  With a heart so tender and warm,
Would never have left Him to suffer alone,
  But creeping right under His arm,
Would have licked the dear fingers in agony clasped,
  And counting all favours but loss,
When they took Him away, would have trotted behind,
  And followed Him right to the cross.



"...any Scraps today, lady"

Sorry, pal, but times are hard and you are not the only one who occasionally has to do without. But one day the good things of life will return in plenty, and among them will be Onehunga woollen products. Until that time comes, treasure your Onehunga or Air-Cell Blankets if you are lucky enough to own them. If you're not so fortunate, let us whisper that limited supplies are occasionally released for civilian needs, and that Onehunga or Air-Cell Blankets possess quality that's well worth waiting for.

ONEHUNGA

ONEHUNGA BLANKETS —— AIR-CELL BLANKETS —— ONEHUNGA WOOLLENS & TRAVEL RUGS. Distributors: SARGOOD, SON & EWEN LTD.

Practical Presents

EVERYONE is so busy nowadays and there is less and less time to spare for the more gracious things of life. Yet no matter how full our days, when we tear the last leaf from the calendar and realise that December is here our minds turn instinctively to the thought of Christmas presents. This need not be an unduly burdensome problem if we tackle it in a methodical manner. The great thing is to PLAN our giving, and I can thoroughly recommend the businesslike system followed by several of my friends who keep a special notebook for the purpose, containing a list of names and a corresponding record of gifts bestowed.

THIS isn't half as much trouble as it sounds, and it is really very handy to be able to look up whether you gave Minnie B— bath salts last Christmas or the one before, and how long it is since you purchased a tie for Cousin Bob, without having to rack your brain to remember the fact. Another good idea is to note people's personal tastes and preferences—how much nicer to present George with the brand of pipe tobacco he most enjoys, and Jane with a kitchen gadget or ornament in her favourite toning. Aunt Margaret is an avid reader of biography, whereas Uncle William never dips into anything more serious than thrillers; mechanics are young Jim's passion and his sister Jean revels in sporting activities of any kind—your popularity where your friends and relatives are concerned will be more securely established than ever by your habit of observing such details and choosing your gifts accordingly.

The packaging of gifts is important, too. Gay wrappings in Christmasy patterns, the use of tinsel cords, picture seals, and coloured tissue paper will give the most prosaic item a festive appearance. Gifts do not have to be expensive to be appreciated. Indeed, it is definitely unpatriotic to lavish your wherewithal on an elaborate display in wartime. If your talents are in the culinary line, why not make a pan of that preserve or jelly for which you are noted? Tie up the pots in cellophane and green or scarlet ribbon; they will prove a more than suitable offering for those who have a "sweet tooth." And provided your precious sugar ration allows, home-made fudge and toffee are ever certain of a welcome, and you can make the most delicious candied peel by soaking the rinds of lemons (and oranges, if you have them) in salted water for 24 hours and then boiling them in a syrup composed of 2 cups of sugar to 1 cup of water until the fruit is tender. Leave on a wire tray to drain and then coat with sugar and pack in air-tight containers. Mincemeat is another seasonal delicacy that is very easy to make. An extra cake-tin is acceptable at any time, specially when it is filled with iced cup-cakes of a sponge mixture which does not require butter.

Have you ever thought of dividing a small wooden box into compartments to hold packets of seeds? Attach a handle to the box and you have a first-rate convenience for use in the planting season by those who like to raise their own seedlings. Shrubs and plants are popular gifts, also, and if your choice runs to garden tools, painting the handles in some bright shade is a cheerful notion. A subscription to a practical magazine or a book dealing with his particular subject will be regarded with favour by the hobbyist. The woman who enjoys dressmaking will find a selection of sewing aids helpful, and if you are handy with a needle yourself, you can fashion all manner of useful articles out of pieces—potholders and oven-cloths; aprons and bookcovers; table-mats of plain cottons rendered decorative with designs in applique; needle-books and cases for scissors; hold-alls and duster-bags to pin on the kitchen wall; coal-mits and coat-hanger covers; posies and pincushions. Chocolate boxes covered in brocade afford a useful repository for many of the odds and ends left lying about for lack of a suitable place in which to keep them. Little girls delight in acquiring additions to their dolls' wardrobes—the eternal feminine, I suppose!—and the most elegant furniture for the doll's house can be manufactured from match-boxes glued together and covered with wallpaper and a thin coating of varnish. Scraps of chintz and other pretty materials can be utilised by cutting them into neat squares of uniform size for some young needlewoman to piece together in a patchwork pattern for her own pleasure. One way of winning a small boy's heart is by creating a Red Indian head-dress for him out of feathers gathered from the fowl-run and stitched on to a wide band and painted gaudy hues. Can't you picture him, arrayed thus and strutting about as "Big Chief Eagle Plume"? Toddlers are easily catered for by bib and table-cover sets of washable American cloth—you can bind the edges or pink them with the scissors, whichever you prefer. And there are a host of patterns available for making soft toys and knitted animals.

Bethlehem

Very sweet was Mary's Baby,
Sweet I know and good,
But the oxen—did they scare Him?
Seems to me they would.

Very sweet the smell of hay was,
Sweet the breath of kine—
She would sing to hush her Baby
Like I'd sing to mine.

Shadows in the farthest corners,
Stars for candlelight—
I wish I knew the little songs
She sang to Him that night.

—Muriel Nicholls.

A Christmas Wish.

Wish me not fame or place or wealth,
Wish me true happiness and health,
Good ears to hear, clear eyes to see,
And love and hope, and memory.
And as I know your hearts are true,
These be the things I wish for you.

Recently I came across these lines:

"The gift we give with loving thought
Must surely reach some goal."

They are exceedingly apt at this time of the year. Whatever your choice in the matter of Yuletide presents, take thought and care over each gift so that it is not just an inanimate object, but a token of the kindliness and good will that form the true spirit of Christmas.

Country Mothers and Child Health

A GENERAL impression is harboured by townsfolk that country people have great advantages in living healthily. The country folk, they feel, get out more into the sunshine and fresh air, they have to brave the bad weather more and should be hardened and resistant; they've the land and manure to have good vegetable and fruit gardens, and they should have ample milk and dairy products; their children ought to be healthier than town children in New Zealand.

THIS Utopian idea must work out in some cases, but it certainly doesn't in the majority. Recently an investigation was made into the figures for a big New Zealand province, to see how the health of the children in that province's capital city compared with its rural children. There was found to be 10 per cent. more malnutrition in the rural children. Further, there were more skin troubles and sores, more chest troubles, more rickety manifestations, and more dental caries. It was apparent that country children were not as healthy as town ones. These figures for this province were checked against those of the Capital City of New Zealand and its surrounding province, to find that the ratio of defects was approximately 11 in city children to 20 in the country.

Contributed by
The Department of Health

Rural Doctor's View

A doctor practising in an entirely rural district wrote in about the surprisingly poor physical development of his country children. "I know from experience," he said, "that many country folk are not keen on fresh air in their living and sleeping quarters. The usual place to sit is in the kitchen, where the air is redolent of roast mutton, drying clothes, and tobacco, and the windows are often unopenable. I also know that the average diet is poor, nearly all bread is white, fruit and greens are uncommon, and when used are long overcooked. Biscuits and cakes are universal, and the use of milk is generally skimpy," he concludes.

The figures support the doctor. The defects could be remedied by sufficient sleep, more fresh air in the homes, and a balanced diet.

Schoolmaster Agrees

The very same deficiencies were published in 1941 after a very careful survey by Mr. H. C. D. Somerset. He found 25 per cent. undernourishment in his school. This is what he says:—"On fully half the farms I visited no milk at all was used as a beverage. Even in a number of the more favoured homes I found that the children were given ample butter and cream, but no milk to drink. The skim milk, so rich in proteins and mineral salts, was fed to the pigs. When I suggested that they should give the children some of the skim milk to drink as well, the suggestion was met with astonishment. Surely 'skim dick,' as it was called, was only pig food. The pigs had the advantage, too, of their daily ration of bran and pollard, while the children had white bread and scones. Over half the children brought lunches to school. All contained white bread, mostly in the form of jam and paste sandwiches, and nearly all white scones, but no brown bread or brown scones were noted. Cheese scarcely appeared at all; about one in twenty included fresh fruit or vegetables, and about the same proportion hard-boiled eggs. Half the lunches contained biscuits, and all at least one piece of cake. None of the children brought to school a bottle of milk."

Prompt Remedy Available

He concluded that the malnutrition he found was dietetic. He proved it was so by getting pupils and homes interested in a more balanced diet and encouraging school and home vegetable gardens and orchards. The malnutrition was very promptly reduced by two-thirds.

Country mothers will get their children bonny by paying attention to nutrition, and fathers will have to help balance the diet by reserving plenty of milk for the house and growing ample vegetables and fruits.

CHILDHOOD recollections! How far away they seem, yet how vividly impressed upon our memories. That is why we should all give our children the best and happiest time possible and fit them to make good citizens. If, when they reach adult years, they can look back on those days and say, "My childhood was a very happy one," then you will have received your reward.—
J.F., Otara R.D.

MEDITATION AT CHRISTMAS

Before you bore Him, Mary,
On that birthday morn
Did you see the clumsy cross
And the crown of thorn?

When you bathed Him, Mary,
And kissed the little head
Did you see the thirsting mouth
And the wounds blood-red?

When you taught Him, Mary,
Lessons at your knee
Did you see Him dying
On the hill of Calvary?

Had you seen the cross, Mary
And the crown of thorn
Would you have braved the childbirth
On that natal morn?

Had you seen His thirst, Mary,
And the wounds blood-red,
Would you have had Him live, Mary,
Or longed that he lay dead?

This world is cruel, Mary,
To simple souls, you know,
They crucify them still, Mary,
As they did those years ago.

—Catherine Keddell.

"A MEMORABLE CHRISTMAS"

WHAT a host of reminiscences this competition evoked. I am sure you will all agree with "Roundabout," who writes: "Of all the old festivals, that of Christmas awakens the strongest and most heartfelt associations in all of us. It commemorates so much of good will, be it by our gathering together, or by thinking of others in a hundred and one little ways."

Her graphic description of a nurse's Christmas won first place for "Bebe M," Napier. "Esperanza," Blenheim, and "Eve," Palmerston North, tied for second place, and "Aloha," Nelson, who celebrated two Christmas Days in one year while on a sea voyage, was highly commended.

First Prize

WHEN I was nursing people used to pity me for being compelled to spend Christmas in an institution; but the jolly companionship of the girls and the air of festivity in the wards made Christmas at hospital even more gay than one spent in the quieter precincts of my own home.

Certainly the work of the poor tired nurses was increased, but no one seemed to mind. Sisters were more lenient, Matron more tolerant, and everybody very happy. Christmas Eve was spent in decorating the ward. There were fresh flowers to be arranged in every available vase and streamers and flags to be hung. The effect was probably garish, but it wouldn't have been Christmas without decorations.

In the evening all the nurses assembled and with lighted candles encased in red crepe paper marched slowly through the hospital singing the well-known carols. Only the soft pink glow of dozens of candles lighted the wards as the ghostly army of nurses passed by. The patients were thrown into relief in the shadows—some bright-eyed with interest, others strangely still and inert, oblivious of the ceremony. Often the paper on a candle caught alight and soft giggles as the flare was extinguished were drowned by the singing.

I always felt pious and noble during this parade. There was an element of beauty and pathos in it.

One year I couldn't be a participant. Earlier in the afternoon we had admitted a young soldier who was deeply unconscious. He was in a diabetic coma and Doctor entertained little hope for his recovery. He had been to the theatre and now there was nothing to do but watch and hope and give him insulin injections at intervals. From his bedside I saw the nurses go by singing carols. It was an impressive sight.

Afterwards the girls, laughing and jolly, would disperse to seek their own pleasure. But here in this room with me death waged a battle with life and youth. I watched tensely, hoping, praying that such a young, vigorous life would not pass out of being. Science was wonderful and able to combat the insidious death from too much sugar in the body, but science alone was not sufficient.

Another nurse relieved me at 10 o'clock, but no change had taken place in the young soldier's condition. His parents had been sent for and arrived white and fearful, tip-toeing with squeaky shoes into the silence of the room.

Off duty I couldn't join in the hilarity. I was suddenly very tired and overwhelmingly sad. The poor boy I had just left and the tragic looks of his parents haunted me and remained when I woke on Christmas morning to the shouts of "Merry Christmas" and laughter. I hastened on duty while the girls were still excitedly undoing presents.

The boy's parents were drinking tea in the office and smiled wanly as I passed. Nurse rose from her vigil at the bedside when I entered the room. Words were not necessary. I knew from her smile and brisk nod that my soldier patient was going to get well. "Peace on earth—good will," my heart sang. It was my best Christmas gift that year, life given to one whom God had so nearly claimed.

"Bebe M.," Napier.

Second Prize (Equal)

THE Christmas I write about is not only memorable, but definitely unforgettable. It was the year 1910. We, a party of English people, were spending a holiday in the Argentine. A girl friend and her husband had come down from the hills for the festive season to swelter with us in the valley. We had had a hectic night with mosquitoes, huge moths, and bats making us sweat with horror as well as with heat. In the early Christmas hours some bright soul turned on the gramophone, and we thrilled to hear "Come, All Ye Faithful," which filled us all with thoughts of home. Later in the day presents were given and admired. We looked with longing at the snow-capped Andes, their snowy, lofty heads high in the sky—a sky without a cloud, and heat which shimmered and set trees and fences dancing. Food was unpopular—occasionally someone would shake a lukewarm cocktail, or hand round a gourd of boiling mate, and the musical soul mentioned earlier would run his clammy hands over his banjo, certainly a cheery sound. Down the road Indians passed silently on sleepy mules, with a heavy cloud of dust following like a submissive geni. The only quick movement was that of the vivid green and blue lizards, the only effortless sound that of the tireless cicada. Suddenly came the noise of a madly-galloping horse. "A drunk," said one of us, using the Spanish term "borracho." The horseman stopped abruptly by our adobe, and a sharp exclamation from the Englishman who was our guest made us realise that something was wrong. The horse was most distressed and its rider dismounted stiffly. He spoke spasmodically — licking his parched lips. His speech was too much of a patio for us to follow. (We could converse only in very precise Spanish.) However, it seemed that the foreman who had been left in charge of our friends' home in the hills had been murdered. We were badly shocked, as we had spent some time there and remembered him as a very courteous and charming man. I liked him particularly, as he had lent me his horse, a superb animal.

We forgot the heat. Our young friend saddled up some fresh horses and he, together with some of the men of our party, started off for the scene of trouble. When we heard the events later they sounded like a penny dreadful. Jose was the name of the murdered man, Pedro the man who killed him. Between these two men was no personal quarrel, but just one of those long-standing feuds between two families, and it was Pedro's turn to "get his man." After this horrid deed Pedro hid in a quarry. The police made Pedro's house their headquarters. Pedro's sister kept house for him. She was a beautiful girl, and appeared to be very contrite—treating the police with great hospitality, so great indeed that when these good men woke up miles away in the "Monte," minus their clothes, they realised that Luisa had been one too many for them. Eventually the murderer was caught. When we were returning to Buenos Aires on our way home we saw him, a tall, sinister man swaggering in a scarlet poncho. He was quite unshackled, and two small "vigilantes," with long whips in their hands and short swords and revolvers at their waist, kept indifferent eyes upon him. Pedro had given his word that he would not escape, but he did—the bribe was too tempting.

"Esperanza," Blenheim.

Second Prize (Equal)

I WAS married to a New Zealand Flying Officer on December 15, 1940. In England at this time the Battle of Britain was at its peak, and my husband, being one of the night fighters attached to a leading squadron, was not able to get more than three days off for the wedding. Being a nurse, I was more fortunate and had a fortnight's leave, which gave me till after Christmas. However, we made the most of the three days, although the thought of being apart for our first Christmas made us feel rather sad. We parted at the station on December 18, promising to write to each other every day and think of one another especially on Christmas Day.

It was Christmas Eve. The siren had just sounded, as it did every night in London during this period. I was sitting looking into the fire and living those three wonderful days over again and feeling miserable at the prospect of spending Christmas without my husband, when the doorbell rang. Who could it be? The air raid warden, probably, since he was the only person I could think of being out in an "alert."

Competitions

JANUARY

Have you chosen the twelve things you consider the most beautiful? The closing date is January 15.

FEBRUARY

We all have some particular activity at which we excel. Maybe it's jam-making or driving a car or sewing a fine seam; maybe it's organising a bazaar or baking a cake or growing flowers—whatever happens to be *your* favourite job jot down the details and see that they are in the mail not later than February 15. There are two prizes for the best descriptions of

"WHAT I PRIDE MYSELF ON DOING BEST."

"MARY,"
C/o "Journal of Agriculture,"
P.O. Box 3004, Wellington.

I opened the front door, being very careful not to show a light. It was absolutely pitch black and I could not see who was standing there.

"Who is it?" I said. I could hardly believe it when my husband's voice replied. Only that afternoon I had received a wire from him wishing me a happy Christmas!

When he came inside into the light I found he was laden with a sack full of parcels, so that to me he looked just like Father Christmas himself. The C.O. of his station had given all the married men seven days' Christmas leave. What joy we had undoing all the parcels which had just arrived from New Zealand—we were able to have peaches and cream and all sorts of lovely things for the Christmas party we gave for the 10 of us who were on Christmas leave.

"Eve," Palmerston North.

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The Song of the Bells

By "JONATHAN."

THE neighbours called him Little Hans, not that he was particularly small, but because that was what Thora, his wife, had called him and somehow the name stuck. Hans's cottage was quite close to the church and the cemetery, for they did not believe in hiding their loved ones who "went from them," these early Norwegian settlers. They liked to have them close so that at odd moments they could slip over and weed the tiny gardens and plant a few flowers on some new plot. Myrtle trees and trim box hedges there were in plenty, and clumps of sweet-smelling red roses guarded the gateway to each garden, and in December tall Christmas lilies bloomed by the church door—the church which brought back to these pioneers something of the distant country which they had left behind.

Little Hans was a wonderful bell-ringer, perhaps because as a boy he had watched the bell-ringer in a big church in Trondheim. He loved to talk of those early days and of how the bells spoke to him, and he had trembled for "what they would say" when he was allowed to pull the rope for the first time. Thora had been there that day to listen, and he had indeed made the bells speak. As he talked you could see by the rapt look on his face that even now he was thinking of the message he wished the bells to give. At Christmas they pealed joyously, telling of the mystical coming of the Christ-child. On Good Friday, or "long Friday," as the settlers called it, the bells tolled slowly and solemnly; but on Easter morning they rang out a song of hope and gladness once again for these children of an old land who had travelled so far to make a home in a new country. And next to his wife and family the bells were Hans's chief joy.

Alas! out of that home went two of the children, David first, and then John—the wasting sickness took them. Then Thora, the mother, wasted away and Hans and the neighbours tenderly laid her to rest. The music of the bells was sad for a long time after that. Hans became father and mother both to the three remaining children, Paul who was 10, his seven-year-old brother, Oscar, and the little Angela. Many of the neighbours wished to help in their care, and there were some who thought Hans should have married again, but somehow he could never believe that Thora had gone very far away from him. In between looking after his small farm he cooked for the children and washed and mended their clothes. He took Angela with him everywhere—it was as though Thora was nearer still, then. The three did well at school and on Saturdays they went to the Pastor, who prepared them for confirmation. Now Hans rang the bells joyously: it seemed as if Thora knew how he was trying to look after the family.

In time the two boys reached manhood and married and went to live in the next settlement. Angela became even more dear to him, and sometimes Hans would smile and think, "How like Thora Angela grows." . . .

It was the day before Christmas and Angela's wedding-day—a mid-summer morning, clear and beautiful, without a breath of wind to disturb the bride's veil as she walked to the church holding her father's arm. Angela had always specially loved the Christmas season, and now, when the lilies bloomed in their stately beauty by the church door and the roses were showering their fragrance over the little gardens, she was marrying Godfreid, the son of her father's best friend. Hans was glad to think that her choice had fallen on so worthy a young man. "Dear God," he prayed, "let them be happy."

Angela and Godfreid made a handsome pair as they preceded their guests to the cottage which had sheltered Hans and his family for so long and where Godfreid had fallen in love with the fair, blue-eyed girl who now walked by his side. She was saying, "Now Father will be able to take that holiday. He can visit Paul and Oscar, and Aunt Hannah, too." Godfreid agreed, and then the talk lapsed—they just held each other's hands tightly and thought of the long, happy years ahead.

The wedding feast was gay. Kindly friends had decorated the house and helped with the food. The older folk talked of their own youth in the homeland; the young ones spoke shyly to each other, thinking of their own time to come, but Hans's thoughts were of Thora and their wedding day. Always he had been conscious of her comforting presence, particularly when the children were small and he was tired with his efforts at caring for them. Then in some strange way he had felt that she knew of his weariness and helped him in his work. Now, although he walked among his daughter's wedding guests and talked with them and laughed at their jokes, his heart was elsewhere.

Children

You may give them your love, but not
your thoughts,
For they have their own thoughts.
You may house their bodies but not
their souls,
For their souls dwell in the house of
to-morrow.
You may strive to be like them,
But seek not to make them like you,
For life goes not backward nor tarries
with yesterday.

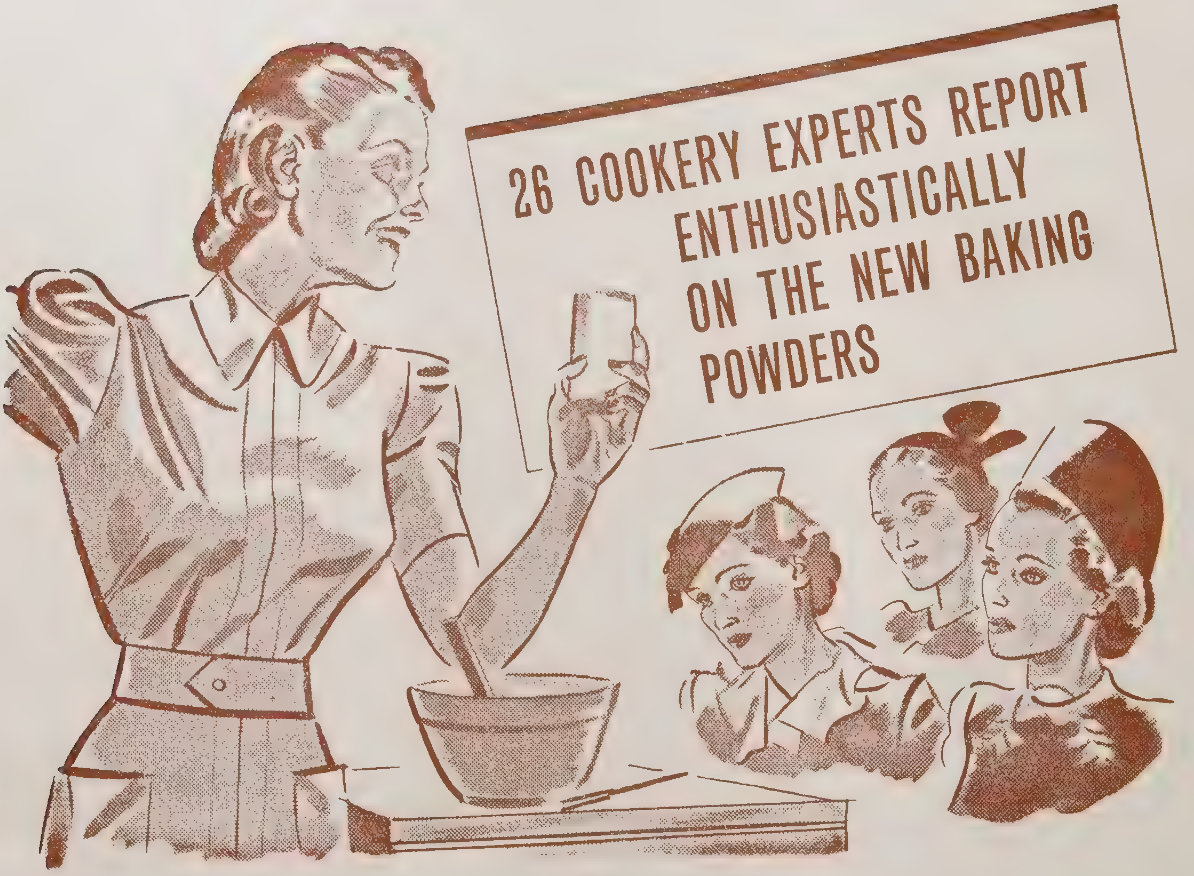
—A Third Century Persian Poet.

But now they had all departed and he sat alone. The big clock ticked above the mantelpiece. Nine o'clock, the face said. Tomorrow, after the service, he would start on his journey to see Paul and the others. Young Axel, the pastor's son, who too loved the bells, would ring them while he was away, and old Peter and his wife would milk the cows and see that everything was ready for the young couple when they returned. The wedding celebrations had gone well, everyone had said, and Angela's crown of myrtle had been just like the one Thora had worn so long ago. With a sigh of deep content Hans lay back in his chair—yes, everything had gone well. His work was done. . . .

In the morning when the bells chimed the Christmas message and the neighbours came to walk with him to church before wishing him "God speed" on his trip, they found he had already started on the last journey of all.

Children think not of what is past, nor what is to come, but enjoy the present time, which few of us do.

—La Bruyere.


26 COOKERY EXPERTS REPORT ENTHUSIASTICALLY ON THE NEW BAKING POWDERS

Samples of the new baking powders based upon pure food phosphate were sent to 26 cookery experts in all parts of the Dominion. They were invited to both use and mis-use it, and report their findings.

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Pure Food Phosphate for baking powder manufacture is a product of Albright & Wilson, and is distributed in New Zealand by Imperial Chemical Industries (N.Z.) Ltd., 16 The Terrace, Wellington.

Their Christmas Star

By MARJORIE TERRISS.

"WELL, really, of all the muddle-headed creatures! To get the car stuck in a bog, miles from anywhere—and on Christmas Eve, too!" The petulant voice, so clear on the still night air, ceased. Its owner stared sullenly over the head of her companion, as he tried ineffectually to back the car on to the firmer ground."

"I'm sorry, Bunty, my dear; these country roads aren't very adequately lighted—and there must be a spring just here, to make such a sodden patch. I'm afraid there's nothing for it but to get help from the nearest farm."

"You needn't think I'll wait by myself, then, while you tramp half a mile up the road. I'm coming with you, and if I rick my ankle, it's your fault." Bob helped her over the muddy patch, and tucked her arm in his, instead of reminding her that the whole idea of the midnight drive was **hers**, when she tired of the dance to which he had taken her.

"The stars, Bunty, aren't they brilliant tonight! And isn't it a change to see ALL of the sky at once, instead of just glimpses between crowded buildings."

"I don't know, it's so immense, it scares me. I'll be glad when we get to the house. Look, there's one; I can see a light in the window. We're lucky. Let's hurry." So they went on, to where a sombre pine tree stood guard over the little cottage.

Bob's knock brought a tired and anxious-looking woman to the door. "My husband is just going for the doctor; our little girl is sick," she said, when he explained his difficulty. "If Miss Bedford may wait here, I'd gladly bring the doctor, once we get the car out of the bog," replied Bob. So while the two men went off with planks and ropes, the cottage received its unaccustomed visitor. The contrast was noticeable between them, not only a matter of clothes, manicure, and coiffure. Bunty's pretty face and rather bored expression lacked something that shone from the eyes of the older woman.

Mud-stained slippers were soon put to dry, and work-worn hands smoothed the velvet wrap, where it lay over a chair. Bunty's offer of help was received thankfully, if a little doubtfully, by Julie's mother, and between them they prepared a poultice to relieve the heavy breathing.

"See, darling, this will make it better," she said as she brought it to the sickroom, Bunty just behind her.

"Mummy—the pretty lady! Oh, let me touch her silver dress!" whispered the child hoarsely. So Bunty sat on the side of the bed and recalled one after another of the forgotten games of childhood, in response to the little one's eager, "What next?" A handkerchief was knotted to form a little man who nodded and bowed, fingers were interlaced to make shadow animals on the wall, paper was folded into cocked hats, till the two were firm friends.

When the little one was getting sleepy her mother said, "If you could tell her a story, just till the doctor comes, it would make all the difference to her temperature, if she gets some sleep." So the hot little hand was curled in a cool smooth one, while a gentle voice began, "Once upon a time . . ." Presently Bunty tiptoed to the window to watch for the car, but was recalled by "'Nother story, please." The starry skies had shaped her thoughts, unawares, in that moment or two, and Julie slept at last, as the ageless tale of "shepherds abiding in the fields" drew to its close.

Soon afterwards the three men returned. With an appreciative word from the doctor, over a cup of tea, and expressions of grateful thanks from the parents, the travellers went on their way.

They had gone only a short distance when Bunty, all her petulance vanished, begged Bob to stop. "I can't forget them, they were so grateful for so little. I wish we could do more for them."

"They'd be independent, I know," said Bob thoughtfully. "And yet, we couldn't leave something in the letter-box, I suppose?"

"No, but that gives me an idea! We can reach them through **Julie**. There was a pine tree by the gate—let's go back and trim it, for a surprise when she wakes! Think how she'd love it! **Do**, Bob!" and she bounced excitedly up and down. He agreed readily, and very quietly they drove nearly up to the gate again.

"My beaded handbag on this branch, and the chiffon scarf on that one. They're not practical gifts, but they will supply the glitter and colour that belong to Christmas. I wish we had . . . but we have! Two balloons from the pocket of the car, and that handful of streamers from the dance. The very thing!"

Bob produced them, and a packet of chocolate as well. "It's **your** idea, Bunty, but what could **I** give?" he said,

Christmas Carols

The snow lay on the ground, the star shone bright,
When Christ our Lord was born on Christmas night,
When Christ our Lord was born on Christmas night.

'Twas Mary, daughter pure of Holy Ann,
That brought Him to this world, our Lord made man,
That brought Him to this world, our Lord made man.

She laid Him on the straw at Bethlehem,
The ass and the oxen shared the room with them,
The ass and the oxen shared the room with them.

—Traditional (from South Wales).

Sweet Jesu, in a stable born,
O come and wake me every morn;
Come Thou with me along the way,
In all my work and all my play.
Through day and night my comrade be,
That I may wake and sleep with Thee.

(From an old Flemish Carol).

O come, all ye faithful,
Joyful and triumphant,
Come ye, O come ye to Bethlehem;
Come and behold Him
Born the King of angels;
O come, let us adore Him, Christ the Lord.

Sing, choirs of angels,
Sing in exultation,
Sing all ye citizens of Heaven above,
Sing ye, All glory
To God in the highest!
O come, let us adore Him, Christ the Lord.

(From the Latin, 13th century).

patting his pockets. "Ah, I know! My tobacco pouch, it's freshly filled. And I could hide half a crown in the purse." All of which was speedily done, and the conspirators set off again for home.

But first, Bob drew Bunty very closely to him. "It's morning, darling, Christmas morning! A happy day to you!"

"And to you, Bob, my dear. See, there's a star that almost might be the Star of Bethlehem, it's so bright and so steadfast."

"It's certainly the 'Love star,' Venus, with its little companion star, nearly as close as you are to me! Shall we make it **our** Christmas Star, and keep it all the year?"

With a happy sigh, and one last look at the gift-laden tree, Bunty agreed.

Midnight Mass in Westminster Abbey

From
"ARMY WITHOUT BANNERS,"
by Ann Stafford.

A FEW of us got permission to go down to Westminster Abbey for the midnight Mass. People were lined up in the square when we got there, waiting in the cold dark night as obstinately as any film queue. You had the feeling that many of them would have been too shy to go by day, so that you were aware of the strange, secret selves hidden inside the toughest of us, charmed out at midnight by the sound of a Christmas carol. In the Abbey there were no lights except the candles that burned at the altar; their glow brought to life the springing arches so that you wondered if perhaps the builders intended it should look thus at night; all detail blurred in shadow, the pillars and buttresses dark and heavy as the weight of this world, the glow over the altar fragile and lovely as the hope of the next. As we settled there came the grinding of metal against stone as a thousand tin hats were stowed away.

So, in past days, generations of armed men must have come there, to cross themselves and ask a blessing or to give thanks for safe return. Men back from the Crusades, from Agincourt, from the Armada, from Trafalgar and Waterloo, from Passchendaele and Vimy Ridge, their prayers seemed to linger there still, mingling with ours, their vivid simple faith vitalising our half-belief. We began to sing "Once in Royal David's City . . ." and there were tears in our voices. Once we'd been happy children, singing out the simple beliefs of our hearts. Now we were weary exiles, with years of semi-scientific thinking and cheap philosophy and economic slogans arid about us, caught up in each other's sorrows, pricked with anxiety and numbed with suffering. As we sang we were homesick for all the simple things, honour and truth and love and peace of heart. And if we weren't very good and hadn't much use for churches, and if our knees were stiff and our responses uncertain, and if we didn't know what we believed and what we didn't, perhaps none of that mattered and if the God so many of us still hoped to find looked kindly down on us because we brought there a great love for one another and a great homesickness for the good and simple things.

The sun goeth down in gold;
The earth lieth cold;
Grey is the sky, and grey
Drops the weary day.
All is still
As the church on the hill
And time is a moment to pray.

—JOAN WARBURG.

THE MORNING CAME IN.

The morning came in
Like a door opening,
Like a child standing
Against the whole day.

The morning came in
Like a child holding
In her hand apples
That came the warm way.

The morning went out
Like a child swinging
On the gate, singing
"I'll come back your way."

—J. J. Keith.

Love came down at Christmas,
Love all lovely, Love divine;
Love was born at Christmas;
Stars and angels gave the sign.

If one advances confidently in the direction of his dreams, and endeavours to live fully the life he has imagined, he will meet with success unexpected in common hours.

—Thoreau.

Mary's at Home

THE news from overseas is so good it would brighten the dullest day. What a wonderful thing for the people at Home to have their lights on again. I have a sister living in Sussex who is on the direct path both of German raiders and our outgoing bombers. She says the noise is worse than the black-out. She is an artist and knows Dame Laura Knight, so I was very interested in your article on that famous woman. Perhaps, some day, my sister's work will be well known, too. She illustrates books, chiefly nature books, for children.—**"Bee."**

HERE is a "howler" which came from the Sunday School in which I teach. The teacher of the tinies was telling her class the story of Noah, and arriving at the part where Noah opened the window to let out the raven, she said to the children: "I wonder what Noah said when he opened the window?"

Silence—and then a small four-year-old boy piped up: "He said, 'Thank goodness the rain's stopped.'" Not bad, was it?

Thank you for your pages. I do enjoy them and the dear little verses you print in them.—**"Alix."**

I ALLOWED the kiddies to ask four little neighbours to tea and listen to the Children's Hour. My seven-year-old girl made place cards and helped me wrap up little parcels of sweets in coloured paper, and we pasted paper hats. Then I bought a few gaily-coloured whistles (good and rowdy!) and some small packets of crayons for little gifts. The kiddies got such a thrill out of doing all the things for themselves the day before and it kept them busy nearly all day. It also showed them that mother has quite a bit to do to run even a small party. I made a batch of ice-cream and some jelly the night before, and the children arranged small bouquets for each place. Your chocolate cake recipe was most popular.—**"Mrs. A."**

"TINKLE TINKLE" expresses a desire to exchange cuttings with "Sunny," "Ysthbeth," and myself. It would give me great pleasure, and these words of S. Coolidge convey the spirit in which I would try to co-operate:—

"But as we meet and touch each day
The many travellers on our way,
Let every such brief contact be
A glorious, helpful ministry!"
The contact of the soil and seed—
Each going to the other's need,
Each helping on the other's best,
And blessing each as well as blest."

—"Autumn Tints."

Christmas Catering

CHRISTMAS certainly calls for our best efforts in the catering line. Even if the joint of lamb has to be smaller this year and the plum pudding not so rich as usual, there is no need to lament the lack of traditional Christmas fare. What if you do have to depart from your customary recipe for fruit cake and choose a plainer one? You can still render it the piece de resistance of the tea table by making a special icing for it and decorating it with holly sprays, or a miniature Father Christmas, or tiny Christmas trees or fir sprigs stuck in "pots" formed by red or silver-painted corks.

Mincemeat can be used in a variety of ways, not only as an accompaniment to pastry; and the addition of beaten egg-whites will turn fruit jellies into the most realistic "snow." Before you start your baking it is well worth while spending a little time designing some cardboard shapes for your cookie-making. Who would recognise your usual plain biscuits in the guise of Christmas stockings, frosted lattice-wise in pink and white to resemble net? Maybe you would like to try your hand at stars or bells or other motifs appropriate to the season. The homely sponge roll can be turned into a most decorative log cake and meringue icing completely transforms an ordinary layer cake.

Here are several hints to assist you in making your butter ration go as far as possible in your Christmas catering:—

1. Use half the amount of butter stipulated in cake and biscuit recipes and substitute lard for the remainder of the butter.
2. Save all your dripping and clarify it by heating it gradually with raw potato (allow 4 slices of potato to 1 quart of fat). Strain through several thicknesses of butter muslin and leave to set. Slice equal quantities of butter and clarified dripping into a basin and beat well together till the mixture becomes thick and creamy. Then shape into pats.
3. For table use: Soften 1 teaspoon gelatine in 1 tablespoon hot water and cool. Now cut the butter into small pieces and heat over hot water till soft enough to beat (do not let the butter melt). Add the gelatine, ½-teaspoon salt, and cup milk, and whip these gradually into the butter with a rotary beater. Pack in an oblong-shaped dish and leave to set firm.

CHRISTMAS CAKE.

1¼lb. flour, ¾lb. butter, 8oz. sugar, 8oz. currants, 8oz. sultanas, 4oz. lemon peel, 4oz. raisins, blanched almonds (optional), 6 eggs, 1½ teaspoons baking powder, 2 tablespoons golden syrup, 1 teaspoon each of essence of lemon, almonds, and vanilla, 1 teaspoon each cinnamon, spice, and nutmeg. Cream the butter and sugar, add the eggs, beating well, and then the essences and golden syrup. Sift the flour and baking powder. Add to the mixture and lastly the nuts and fruit, well floured. Bake in a slow oven for 2 hours.

Royal Icing.—The white of one egg beaten. Icing sugar to make a stiff paste, vanilla flavouring. A pinch of cream of tartar may be added, also 2 drops of liquid washing blue to ensure the whiteness of the icing.

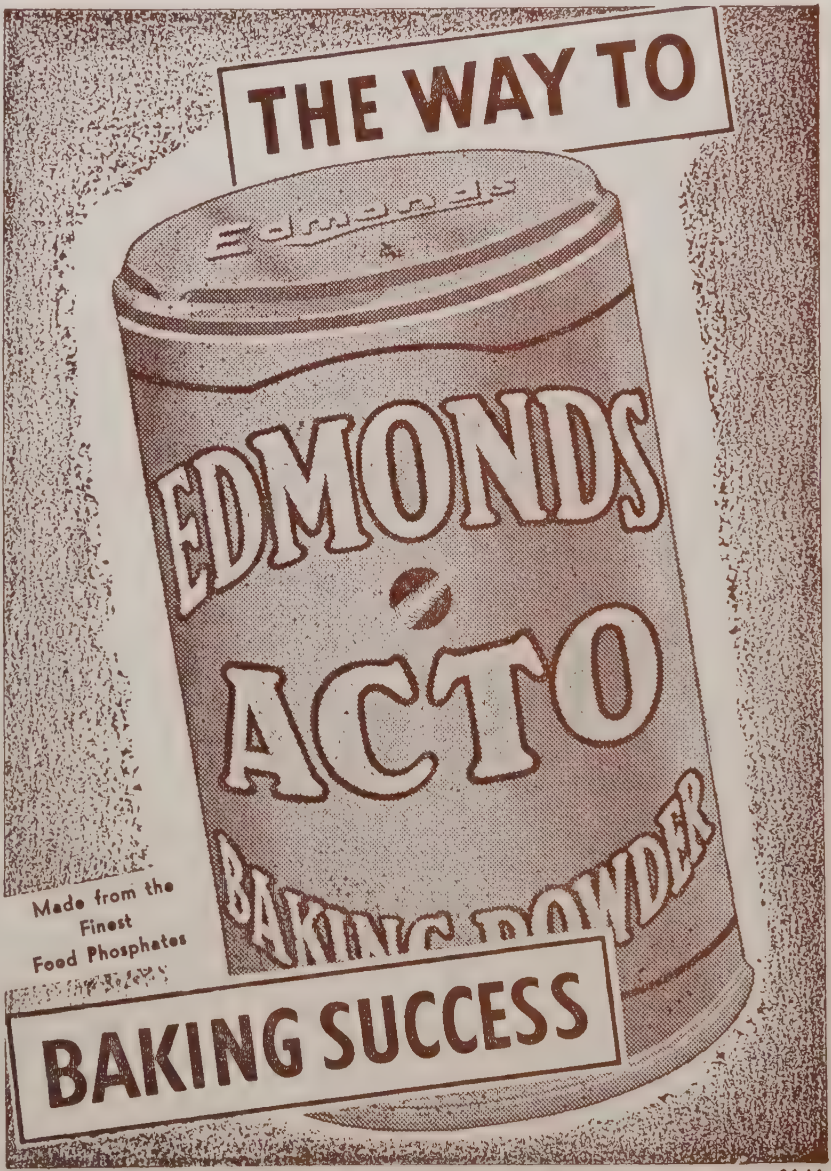
CHRISTMAS PUDDING.

1½ cups flour, ½lb. butter (or ¼lb. butter and ¼lb. shredded suet), ½ cup breadcrumbs, 1 tablespoon golden syrup, 4 eggs, 4oz. sugar, 1 teaspoon spice, ½lb. sultanas, ½lb. raisins, blanched almonds (optional), 2oz. lemon peel, 1 small teaspoon baking soda.

Rub the butter into the sifted flour, add the dry ingredients, fruit, and beaten eggs. Dissolve the baking soda in a little hot water and add. Steam in a covered basin for 4 hours.

MINCEMEAT.

1½lb. apples, ½lb. currants, ½lb. sultanas, ½-teaspoon spice, ½-teaspoon cinnamon, 4oz. brown sugar, 2oz. grated



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suet, 1 tablespoon lemon juice, ½ lemon rind, grated.

Peel and mince the apples and mix well with the other ingredients.

MINCEMEAT SCONES.

1lb. flour, ½-teaspoon baking powder, 2oz. butter, 1oz. lard, 2oz. sugar, 1 cup milk, mincemeat.

Sift the dry ingredients and rub in the butter. Mix to a soft dough with the milk, turn on to a floured board, and cut into rounds. Bake in a hot oven 15-20 minutes. Split in halves and fill with mincemeat.

MINCEMEAT PUDDING.

8oz. flour, 1 cup mincemeat, 1 egg, ½-teaspoon baking soda, ¼-teaspoon salt, 2oz. sugar.

Sift the flour, stir in the mincemeat, sugar, and salt, add the beaten egg, and lastly the baking soda dissolved in a little milk. The mixture should have the consistency of batter (add a small quantity of milk if the mixture is too stiff). Pour into a buttered basin and steam 2-2½ hours.

MISTLETOE BISCUITS.

1 cup wholemeal, ½-cup flour, ½-cup sugar, ¼-cup butter, ¼-cup golden syrup, milk, 1 teaspoon baking powder, pinch salt, ½-teaspoon baking soda, 1 teaspoon spice, ½-teaspoon ground ginger, jam, icing, jubes.

Cream the butter and sugar, add the dry ingredients and golden syrup. Dissolve the soda in the milk and add, mixing all together to form a firm dough. Turn on to a floured board and roll out thin. Cut into rounds and bake in a moderate oven 15 minutes. Fasten together in twos with jam. Decorate with pink icing and twin strips of green jube to represent mistletoe leaves and a centre "berry" cut from a white jube.

NOEL CAKE.

2 eggs, ¼lb. butter, ¼lb. sugar, ¼lb. flour, 1 teaspoon baking powder, 1 tablespoon coconut, 1 teaspoon cocoa.

Cream the butter and sugar, beat in the eggs, and then add the sifted dry ingredients. Cook in two greased 6in. diameter sponge tins. When cool fill and ice with meringue frosting.

Meringue Frosting.—Dissolve 1 teaspoon gelatine in ½-cup hot water. Beat an egg-white stiffly and then add the gelatine gradually, beating all the time. Add 1 cup icing sugar and continue beating until thick and fluffy. Lastly, add vanilla or raspberry flavouring and a few drops of cochineal to give a delicate pink colour. Pile between the sponge layers and on top of the cake. If fruit is available (raspberries, strawberries, peaches, bananas, etc.), crush sufficient to fill a small cup and add it to the white of egg before combining it with the gelatine. Chopped nuts also blend well with this frosting.

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CHRISTMAS STOCKINGS.

1¾ cups flour, ½-teaspoon baking powder, pinch salt, ¾-cup sugar, ½-cup butter, 1 egg, essence of lemon.

Cream the butter and sugar, add the egg, and then the dry ingredients. Roll out on a floured board. Lay a cardboard shape of a Christmas stocking (about 3½in. long) on the dough and cut out the biscuits in this design. Bake in a moderate oven 12-15 minutes. Decorate with pink and white icing in criss-cross fashion to look like net. This same recipe can be used to make biscuit "robins" (give them red and chocolate icing plumage). These are to perch on top of the snow pudding.

ROAST HAM.

Weigh the ham. You will need to allow ½-hour cooking time per lb. Place skin side up in a baking dish, flour, and add sufficient fat for basting. Cook in a moderate oven and an hour before it is done take it out of the oven and remove the rind with a sharp knife and score the fat under the rind. Return this to the oven for the fat to brown and then brush over the fat with a mixture of 2 tablespoons vinegar and ½-cup brown sugar, and continue baking the allotted time. Serve with apples which have been cut in halves and roasted with brown sugar and a little water.

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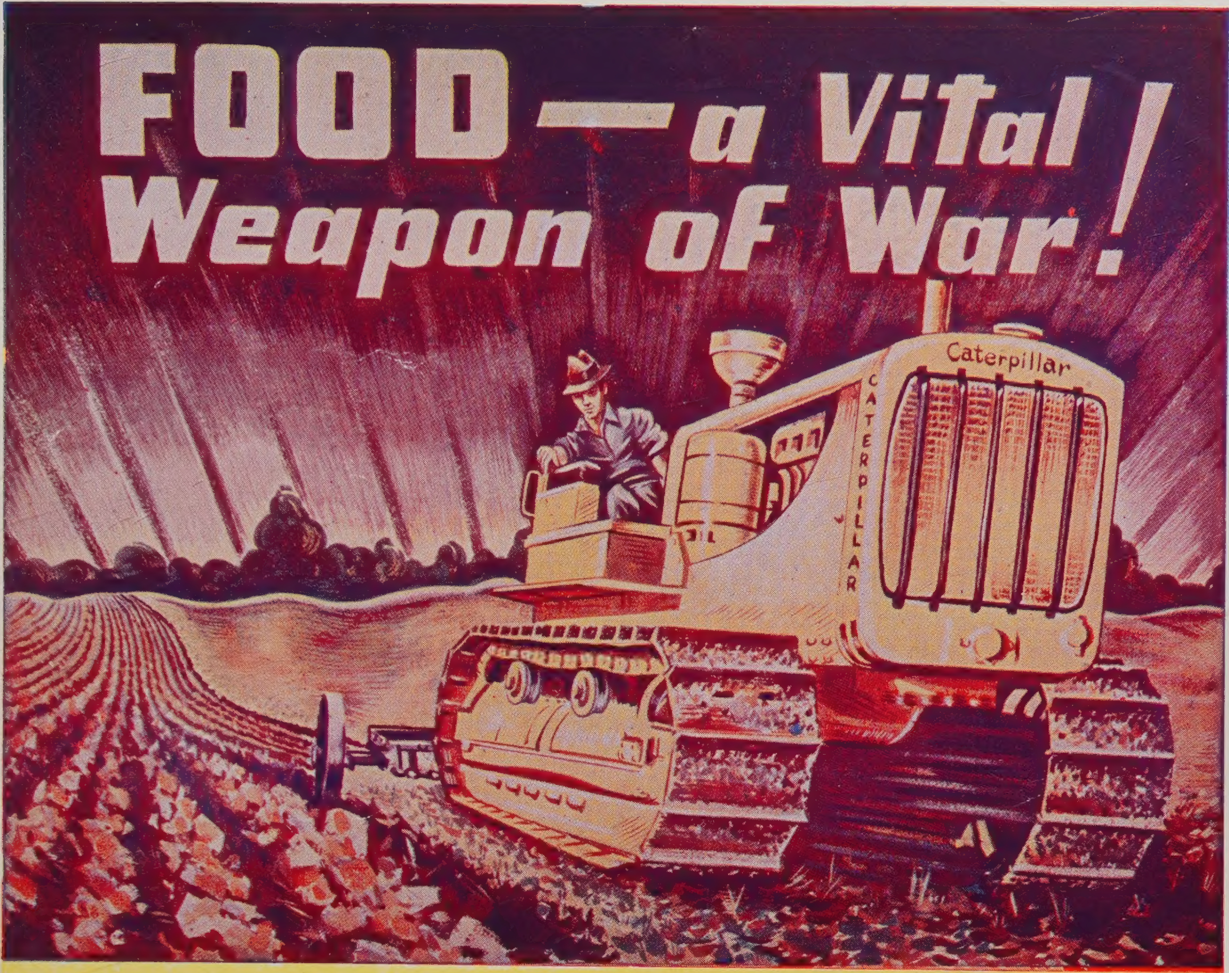

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